FINAL REPORT

UPDATE EXISTING EEAP

FORT CARSON
COLORADO SPRINGS, COLORADO

Prepared for

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, OMAHA DISTRICT
OMAHA, NEBRASKA

Under

CONTRACT DACA45-91-D-0009
EMC No. 2102-001

July 1993

By

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This report has been prepared at the request of the client, and the observations, conclusions, and recommendations contained herein constitute the opinions of E M C Engineers, Inc. In preparing this report, EMC has relied on some information supplied by the client, the client's employees, and others which we gratefully acknowledge. Because no warranties were given with this source of information, E M C Engineers, Inc. cannot make certification or give assurances except as explicitly defined in this report.

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LIST OF ABBREVIATIONS

AHU	-	air handling unit
AIRR	-	adjusted internal rate of return
ASHRAE	-	American Society of Heating, Refrigeration, and Air Conditioning Engineers
Bldg	-	Building
cfm	-	cubic feet per minute
EA	-	each
ECIP	-	Energy Conservation Investment Program: An element of the Military Construction Army funding authority specifically set aside for energy conservation projects that meet specified economic criteria.
ECO	-	Energy Conservation Opportunity
EMC	-	E M C Engineers, Inc.
F	-	Fahrenheit
ft	-	foot, feet
ft^2	-	square feet
ft^3	-	cubic feet
FY	-	the federal fiscal year
hr	-	hour(s)
H&V	-	heating and ventilating
HVAC	-	heating, ventilating, and air conditioning
Investmt	-	investment
kcf	-	thousands of cubic feet
kW	-	kilowatt, one thousand watts
kWh	-	kilowatt-hour, one thousand watthours
LCCA	-	Life Cycle Cost Analysis
MBtu	-	British thermal units (million)
No.	-	number
SF	-	square feet
SIR	-	Savings-to-Investment Ratio: Total life cycle benefits divided by 90% of the differential investment cost.
SPB	-	simple payback: The project investment cost divided by the sum of the annual energy and maintenance cost savings

UCS	-	utility control system: a computer-based system including Direct Digital Controls used for the control of building conditioning equipment and utility systems
U.S.	-	United States
U-value	-	A coefficient expressing the thermal conductance of a composite structure in Btu per (sq ft) (hour) (degrees F temperature difference); Btu/(ft^2 x hr x °F).
W	-	watt(s)
yr	-	year(s)

EXECUTIVE SUMMARY

GENERAL

This study reevaluates three Energy Conservation Opportunities (ECOs) from a 1985 study, evaluates the application of the Conserval Solarwall active solar system on five buildings, and estimates the cost of repair to heating and cooling equipment temperature controls on 82 buildings.

ECO EVALUATIONS

Certain HVAC control system ECOs were studied in 1985 by Forster-Morrell Engineering Associates, Inc, and qualified at that time for implementation under the Energy Conservation Investment Program (ECIP). However, funding for ECIP projects was discontinued before the projects could be implemented. Now that the funding has been restored, it is necessary to requalify the ECOs using current energy prices and current ECIP guidance for life cycle cost analysis. This was done in this study of the following ECOs:

- ECO 13: Replace standard motors with high efficiency motors.
- ECO 14: Install night setback thermostats.
- ECO 16: Install dry bulb economizers on air handling units.
- ECO 19: Install automatic thermostats on steam radiators.

The buildings designated for reevaluation of the ECOs are presented in Table ES-1 below.

TABLE ES-1
BUILDINGS DESIGNATED FOR ECO EVALUATIONS

ECO NO.	Designated Buildings
13	P-1853, P-1950. P-1951, P-1952, P-1953, P-1954, P-2050, P-2051, P-2052, P-2054, P-2060, P-2070, P-2071, P-2072, P-2073, P-2074, P-2150, P-2151, P-2152, P-2153, P-2154, P-2160, P-2250, P-2251, P-2252, P-2253, P-2254, P-2350, P-2352, P-2450, P-2451, P-2452, P-2453, P-2454, P-2700, P-8000, P-8030, P-8142
14	P-1007, P-1955, P-1956, P-2055, P-2056, P-2155, P-2156, P-2700
16	P-1850, P-2359
19	S-6220, S-6221, S-6222, S-6223, S-6224, S-6233, S-6236, S-6237, S-6243, S-6230, S-6231, S-6234, S-6235, S-6240, S-6241, S-6244, S-6252, S-6253, S-6254, S-6255

The results of the evaluations are presented in Table ES-2 below.

TABLE ES-2
PRIORITIZED ECO SUMMARY

ECO No.	Electric Energy Savings (MBtu/yr)	Gas Energy Savings (MBtu/yr)	Investmt Cost ($)	Electric Cost Savings ($/yr)	Gas Cost Savings ($/yr)	SPB (yrs)	SIR	AIRR %
14	22	2,631	5,974	377	9,145	0.6	22.4	28.0
16	0	308	8,697	0	1,070	8.1	2.3	8.4
13	846	0	92,418	8,944	0	7.4	2.0	7.7
19	0	9,875	263,997	0	34,325	7.7	1.8	8.3
ALL ECOs	868	12,814	371,086	9,104	53,645	6.5	2.7	9.4

SOLAR WALL ANALYSIS

A proprietary application of active solar energy technology to industrial buildings has been developed by Conserval Engineering, Inc. of Canada. The Conserval Solarwall is presently under consideration for installation at the AVUM hangar at Butts Army Air field. The application of the technology was evaluated for Buildings P-1160, P-2357, P-8030, P-8142 and P-8300 with unfavorable results. The application of the Conserval Solarwall is not cost effective at any of the five buildings and is not recommended.

TABLE ES-3
SOLARWALL ANALYSIS SUMMARY

Bldg No.	Gas Energy Savings (MBtu/yr)	First Cost ($)	Gas Cost Savings ($/yr)	SPB	SIR	AIRR %
P-2359	126	9,354	626	14.9	0.6	-0.6
P-8300	325	38,835	1,617	24.0	0.4	-5.2
P-8142	231	30,197	1,146	26.3	0.4	-6.1
P-1160	108	19,867	535	37.1	0.3	-9.2
P-8030	957	253,181	4,727	54.0	0.2	-12.5

HEATING AND COOLING EQUIPMENT REPAIRS

The existing pneumatic and electric temperature controls are scheduled to be replaced with Direct Digital Controls (DDC) in a number of buildings at Fort Carson. The heating and cooling coil control valves and modulating air flow dampers will remain either pneumatically or electrically actuated as currently configured. In order for the new DDC systems to function properly, it is necessary for the valves and dampers and their actuators to be in good operating condition with substantial remaining service life. These components were inspected for condition, and necessary repair and replacement actions were identified for each of the 82 buildings listed in Table ES-4.

In general the heating and cooling equipment is well maintained, but most of the heating and cooling coil control valves and valve actuators are near the end of their expected service lives. If the UCS project proceeds to construction, the repairs and replacements identified in this report should be made at the time of construction.

Table ES-5 lists the cost of repair and replacement for each of the 18 groups of buildings identified in Table ES-4.

TABLE ES-4
BUILDINGS INSPECTED FOR EQUIPMENT DISCREPANCIES

Group No.	Building Nos.
1	P-1950, P-2070, P-2153, P-2250
2	P-1951, P-1952, P-1953, P-1954, P-2050, P-2051, P-2052, P-2054, P-2078, P-2071, P-2072, P-2073, P-2074, P-2150, P-2151, P-2152, P-2154, P-2251, P-2252, P-2253, P-2254, P-2450, P-2451, P-2452, P-2453, P-2454
3	P-1007, P-1150
4	P-1118, P-1217, P-1218, P-1219, P-1220, P-1363, P-1364, P-1365, P-1366, P-1367, P-1664, P-1665, P-1666, P-1667
5	P-1227
6	P-1446
7	P-1526
8	P-1528
9	P-1855
10	P-1864
11	P-1955, P-1956, P-2055, P-2056, P-2155, P-2156
12	P-1957, P-1958, P-2057, P-2058, P-2157, P-2158, P-2257, P-2258, P-2457, P-2458, P-2557, P-2558
13	P-1853, P-2060, P-2160, P-2350, P-2352, P-2700
14	P-2357
15	P-1850, P-2359
16	P-8000
17	P-8030
18	P-8142

TABLE ES-5
EQUIPMENT REPAIR COST SUMMARY

Bldg Group No.	Labor Cost ($)	Material Cost ($)	Total Cost ($)
1	1,720	7,824	9,545
2	10,513	88,112	98,624
3	956	6,385	7,341
4	11,507	60,834	72,341
5	478	3,193	3,670
6	707	7,585	8,293
7	765	4,687	5,451
8	0	0	0
9	1,013	6,401	7,414
10	1,032	10,869	11,902
11	1,720	10,623	12,343
12	3,441	15,337	18,778
13	2,485	13,814	16,299
14	2,370	15,547	17,918
15	1,109	8,682	9,791
16	1,319	9,811	11,130
17	593	3,274	3,866
18	745	4,784	5,530
Total	42,472	277,764	320,236

RECOMMENDATIONS

ECO 13 - Motor Replacement: Replacing standard drive motors with high efficiency motors is cost effective, as shown in Table ES-2 on page ES-2. The $92,418 investment cost has an AIRR of 7.7% and an SIR of 4.1, which gives this project a medium priority. The motors should be replaced as soon as funding permits. As a result of the study, it is recommended that a motor replacement policy be established at Fort Carson to routinely replace all failed standard motors with high efficiency motors. This will reduce the electrical demand, save energy, increase motor service life, and lower maintenance costs over the life of the motors.

ECO 14 - Night Setback Thermostats: This ECO is one of the most cost effective ways of reducing energy consumption. The investment cost is only $5,974 and the AIRR is 28%. The payback is just one heating season. It is recommended for implementation with a high priority.

ECO 16 - Dry Bulb Economizers: The investment cost is $8,697 with a payback in 8.1 years, an SIR of 2.3, and an AIRR of 8.4%. Only two buildings are included in this ECO. It is recommended for implementation with a medium priority.

ECO 19 - Automatic Radiator Control Valves: This ECO is the least cost effective of the 4 ECOs evaluated, primarily because of the very large number of radiators in the 17 buildings in the old hospital complex. There are a total of 1,824 radiators to be retrofitted with steam control valves and wall-mounted thermostats. The payback for the $263,977 investment cost is 7.7 years, with an AIRR of 8.3%. This ECO is recommended, with a medium priority, for implementation.

The total investment cost of all qualifying ECOs is $371,086 which exceeds the $300,000 ECIP project threshold limit. Therefore, it is possible to submit the 4 qualifying ECOs as an ECIP project without combining them with other energy projects at Fort Carson. However, the total project SPB of 6.5 years is marginally competitive. It is recommended that cost effective energy conservation projects already identified in other projects, such as for Evans Army Hospital, be combined with those from this study into a single ECIP project to reduce the SPB. This would improve the probability of obtaining ECIP funding. For such an ECIP project it would be necessary to reevaluate the economic effectiveness of the Evans Hospital ECOs using the current ECIP guidance. Program documentation would have to be prepared for the ECIP project.

Conserval Solarwall: This proprietary technology appears to make a lot of sense for new construction of industrial buildings with high ventilation rates and long operating schedules, but it is not cost effective for any of the 5 buildings evaluated, and is not recommended.

Heating and Cooling Equipment Repairs: This evaluation does not involve energy savings, but rather identifies the temperature control elements that should be replaced on 82 buildings in the event a UCS is installed to control the buildings as planned. The cost of $320,236 is

in the event a UCS is installed to control the buildings as planned. The cost of $320,236 is necessary in order to insure the new Direct Digital Controls will be effective in controlling space temperatures.

The heating and cooling coil control valves will have to replaced sometime in the next few years because they are near the end of the expected service life. Replacing them all as a single project will improve space temperature control and reduce maintenance costs over the next several years. The replacement should be done as a single project in the event the UCS project proceeds to construction. Otherwise, the control components may be replaced at the time of failure.

SECTION 1.0

INTRODUCTION

1.1 AUTHORITY

This study was conducted under the authority of Contract No. DACA45-91-D-0009 which was issued and administered by the U.S. Army Corps of Engineers, Omaha District.

1.2 PURPOSE

The purpose of this study is to:

- Reevaluate selected Energy Conservation Opportunities (ECOs) from a previous study.
- Evaluate the application of new solar technology to selected buildings.
- Determine the operational status of controls on air handling units designated for conversion to Direct Digital Controls (DDC) as part of a planned Utility Control System (UCS) construction project.

1.3 SCOPE OF WORK

The Revised Scope of Work, dated January 20, 1993, is included in Appendix A. It contains three major elements:

1. Update the evaluations of four ECOs from a previous study, Energy Savings Opportunity Survey, Fort Carson, 1985, by Forster-Morrell Engineering Associates, Inc.,
2. Evaluate the application of the Conserval Solarwall to five designated buildings,
3. Inspect heating and cooling equipment in buildings designated for installation of DDC to identify deficiencies that require correction prior to the installation of a planned UCS.

The reevaluation of the designated ECOs and the evaluation of the Conserval Solarwall are made in accordance with the October 1992 ECIP guidance, and with current unit energy prices and estimated construction costs.

1.4 ORGANIZATION OF THE REPORT

This report is submitted in one volume:

- Historical consumption data and current unit prices of electricity and natural gas are presented in Section 2.0.

- Section 3.0 presents the evaluations of the Conserval Solarwall applied to five buildings.

- Section 4.0 presents the results of the reevaluations of the four designated ECOs from the previous study.

- Section 5.0 presents the findings of the inspection of heating and cooling equipment and controls designated for conversion to DDC.

- Appendix A contains the Scope of Work and pertinent confirmation notices pertaining to the Scope of Work.

- Backup calculations and supporting data are included in Appendices B and C for report Sections 3 and 4, respectively.

- Building survey forms are included in Appendix D. For most of the buildings included in this study, the survey forms from the 1985 study were used, and changes in data are indicated directly on the original forms.

1.5 ECOs TO BE REEVALUATED

The four ECOs from the 1985 study to be reevaluated are:

ECO 13: Replace standard motors with high efficiency motors (Motor Replacement)

ECO 14: Install night setback thermostats (Night Setback)

ECO 16: Install dry bulb air economizers on air handling units (Economizer Cycle)

ECO 19: Install automatic thermostats on steam radiators (Radiator Controls)

The application of the above ECOs to specific buildings is presented in Table 1-1.

Annex A of the original Scope of Work (Appendix A, page A-11) called for the reevaluation of ECO 31: Revise or Repair HVAC Controls. This ECO definition originated in the 1985 study and involved energy savings from incorporating new temperature control features such as time clocks, setback thermostats, optimized hot and cold deck reset, etc.

During the analysis of ECO 31, it was determined that the very control functions included in ECO 31 were the same control functions included in a concurrent construction project, the utility control system (UCS), scheduled for construction at Fort Carson.

This conflict was resolved by the January 20, 1993 revision of Annex A of the Scope of Work (Appendix A, page A-21), which changed the definition of ECO 31. It was redefined to inspect HVAC units in the designated buildings for discrepancies that should be repaired before the units are converted to DDC under the UCS project. In effect, ECO 31 was redefined so that it is not an ECO. The repairs will generally not result in energy savings, but will return the HVAC units to full operability before conversion to DDC. Eighty-two buildings are designated for inspection as listed in Table 1-1.

TABLE 1-1
BUILDINGS DESIGNATED FOR ECO EVALUATIONS

ECO No.	Description	Designated Buildings
13	Motor Replacement	P-1853, P-1950. P-1951, P-1952, P-1953, P-1954, P-2050, P-2051, P-2052, P-2054, P-2060, P-2070, P-2071, P-2072, P-2073, P-2074, P-2150, P-2151, P-2152, P-2153, P-2154, P-2160, P-2250, P-2251, P-2252, P-2253, P-2254, P-2350, P-2352, P-2450, P-2451, P-2452, P-2453, P-2454, P-2700, P-8000, P-8030, P-8142
14	Night Setback	P-1007, P-1955, P-1956, P-2055, P-2056, P-2155, P-2156, P-2700
16	Economizer Cycle	P-1850, P-2359
19	Radiator Controls	S-6220, S-6221, S-6222, S-6223, S-6224, S-6233, S-6236, S-6237, S-6243, S-6230, S-6231, S-6234, S-6235, S-6240, S-6241, S-6244, S-6252, S-6253, S-6254, S-6255
(formerly ECO 31)	Equipment Repairs	P-1007, P-1118, P-1150, P-1217, P-1218, P-1219, P-1220, P-1227, P-1363, P-1364, P-1365, P-1366, P-1367, P-1446, P-1526, P-1528, P-1664, P-1665, P-1666, P-1667, P-1850, P-1853, P-1855, P-1856, P-1864, P-1950, P-1951, P-1952, P-1953, P-1954, P-1955, P-1956, P-1957, P-1958, P-2050, P-2051, P-2052, P-2054, P-2055, P-2056, P-2057, P-2058, P-2060, P-2070, P-2071, P-2072, P-2073, P-2074, P-2150, P-2151, P-2152, P-2153, P-2154, P-2155, P-2156, P-2157, P-2158, P-2160, P-2250, P-2251, P-2252, P-2253, P-2254, P-2257, P-2258, P-2350, P-2352, P-2357, P-2359, P-2450, P-2451, P-2452, P-2453, P-2454, P-2457, P-2458, P-2557, P-2558, P-2700, P-8000, P-8030, P-8142

1.6 APPROACH

1.6.1 ECO Reevaluations

The original ECO evaluations in the 1985 study were reviewed for approach and results. Applicable buildings were inspected and surveyed for changes in functional use, operating schedules, occupancy, modifications to the thermal characteristics of construction, and for modifications to the HVAC systems. Where changes invalidated the energy savings calculated in the original study, new baseline and ECO energy consumptions were calculated using the Bin Chart Energy Program (BCEP), which was used in the 1985 study. ECO economic reevaluations were made in every case using the latest ECIP guidance, current construction cost estimates and current unit energy prices.

1.6.2 Conserval Solarwall Evaluations

Before starting the evaluations of the application of the Conserval Solarwall to the five designated buildings, the Engineer-In-Charge and the engineer responsible for conducting the evaluations attended a one day seminar on the Solarwall at the National Research Energy Laboratory in Denver. During the seminar, a laboratory test installation of the Solarwall was visited and conducted by Mr. John Hollick, President of Conserval Engineering, Inc.

The design manual and associated literature on the Solarwall were obtained from Conserval Engineering, Inc. for use in the evaluations. The five buildings at Fort Carson were then inspected for application of the Solarwall, and all data necessary for the evaluations were collected. Vertical temperature profiles were measured, along with the surface temperatures of exterior south-facing walls.

The existing ventilation heating loads were calculated using the heating degree day method. Solar insolation data for Fort Carson were taken from a 1981 publication by the Colorado Office of Energy Conservation, *Passive Solar Energy for Builders*. Construction cost estimates were provided by Conserval Engineering, Inc.

1.6.3 HVAC Controls Surveys

Buildings designated under ECO 31 in Table 1.1 on page 1.1 are to be included in a Utility Control System (UCS) project planned for construction at Fort Carson. Under the UCS project, existing pneumatic, electric and electronic controls are to replaced. Equipment not being replaced, but must be in good condition and operable include heating and cooling coil control valves, valve actuators, control dampers and damper actuators. The actuators will remain either pneumatic or electric, as currently configured.

All candidate equipment was inspected for condition. Most of the control valves and valve actuators have reached the end of their expected service life. Needed repairs and replacements were noted, cost estimates were made, and the results tabulated.

1.7 ECONOMIC ANALYSIS

Life Cycle Cost Analysis was accomplished in accordance with the National Institute of Standards and Technology Handbook 135 (NIST HNB 135) and the October 1992 ECIP guidance. There have been no changes to the NIST HNB 135 since the 1985 EEAP study except for annual updates of present worth factors to reflect changes in projected energy price escalation rates and discount rates. However, there have been significant changes to the ECIP guidance since 1985, including:

- The discount rate has been changed from 7 percent to 4 percent, which increases the present value of energy cost savings over the economic life of a system
- The prescribed economic life of the various equipment and system categories has also changed, generally being shortened, which reduces the number of years that energy cost savings accrue for credit in the Life Cycle Cost Analysis.
- The minimum project construction cost for an ECIP project has been increased from \$200,000 to \$300,000, which makes it more difficult to qualify low cost projects for ECIP funding.
- The Non-energy Savings Test has been deleted. Therefore, all non-energy savings are a credit to the Life Cycle Cost Analysis.

Other changes since 1985 that impact the study include:

- Inflation in construction costs.
- Electric energy and demand rates have increased about 35 percent since 1985, whereas natural gas prices have decreased about 26 percent as the result of a new gas purchase contract.

1.8 PERSONS RESPONSIBLE FOR THE WORK

All work on this contract was performed by E M C Engineers, Inc. personnel. Specific responsibilities are as follows:

Project Manager:	Eric J. Young, P.E.
Engineer-In-Charge:	Tom J. Forster, P.E., Ph.D
Building Surveys:	James O. Edwards, P.E.
	Alan J. Niemeyer
	John A. Mekis, P.E.
	Tom J. Forster, P.E., Ph.D
ECO Analysis:	Alan J. Niemeyer
Solarwall Analysis	Dennis E. Jones, P.E.
Report Writing	Tom J. Forster, P.E., Ph.D
Quality Control:	Eric J. Young, P.E.

1.9 WORK ACCOMPLISHED TO DATE

All work required under the contract is included in this prefinal report.

1.10 PLAN FOR COMPLETING THE WORK

The results of the work as presented in this prefinal report will be presented at a formal presentation and review meeting, to be held after reviewer comments are received. Subsequently the report will be revised in accordance with the comments and direction received at the presentation and review meeting, and will be submitted in its final form.

SECTION 2.0

ENERGY CONSUMPTION AND PRICE DATA

2.1 HISTORICAL ENERGY CONSUMPTION

Monthly electrical and natural gas consumption and cost data are presented in Table 2-1 on page 2-2 for FY90, FY91 and FY92.

2.2 UNIT ENERGY PRICES

Electricity: The current unit kWh price is $0.025, and the unit daily kW price is $0.1909, which results in an annual kW charge of $69.68.

Natural Gas: Gas prices have varied considerably since May 1992, but appeared to stabilize at approximately $3.48/MBtu in late 1992, which is the price used for this study.

TABLE 2-1
HISTORICAL UTILITY CONSUMPTION AND COST DATA

FY90	kWh	kW	$	kcf	$
OCT	7,441,303	14,893	271,285	87,449	286,423
NOV	7,738,583	14,677	298,900	131,130	421,048
DEC	7,691,999	15,055	292,970	175,344	541,171
JAN	9,032,785	15,195	320,100	187,697	581,368
FEB	8,033,070	15,466	287,912	200,038	491,363
MAR	7,461,000	15,131	267,564	144,198	453,778
APR	8,406,000	15,001	301,382	115,536	410,169
MAY	7,011,000	14,029	250,481	77,953	255,678
JUN	7,110,000	14,159	262,564	37,920	153,084
JUL	7,299,000	14,850	271,713	48,618	181,749
AUG	7,254,000	14,774	264,531	28,931	122,555
SEP	6,993,000	14,828	225,613	40,846	153,724
FY91	**kWh**	**kW**	**$**	**kcf**	**$**
OCT	8,280,000	13,932	289,552	97,888	225,957
NOV	6,597,000	14,126	234,076	129,531	325,849
DEC	7,974,000	14,872	279,244	191,574	490,023
JAN	9,369,000	15,066	338,243	192,940	445,495
FEB	8,181,000	14,861	291,778	139,713	296,185
MAR	7,362,000	14,591	259,099	142,271	295,330
APR	7,893,000	14,396	276,175	106,914	235,825
MAY	7,002,000	14,440	245,398	57,255	146,609
JUN	7,575,000	14,018	272,091	32,544	103,002
JUL	7,389,000	14,699	284,539	34,222	102,250
AUG	7,317,000	14,915	269,637	35,719	104,067
SEP	8,271,000	15,412	307,316	46,306	123,831
FY92	**kWh**	**kW**	**$**	**kcf**	**$**
OCT	7,416,000	14,105	270,472	90,208	219,516
NOV	8,442,000	14,893	301,676	156,336	354,964
DEC	8,001,000	15,217	295,877	174,282	394,308
JAN	8,370,000	15,163	321,895	172,606	383,687
FEB	8,676,000	15,412	319,081	145,837	285,032
MAR	7,821,000	15,347	289,377	135,969	280,278
APR	7,731,000	14,461	284,130	88,129	198,173
MAY	7,002,000	14,288	257,937	47,612	127,431
JUN	8,460,000	14,990	318,307	39,934	119,766
JUL	7,245,000	14,904	270,779	33,682	108,103
AUG	8,244,000	15,509	311,193	33,794	115,047
SEP	6,732,000	15,142	256,262	41,871	136,326

SECTION 3.0

SOLAR WALL ANALYSIS

3.1 GENERAL:

Conserval Engineering, Inc. of Canada offers a solar air collector in the form of an exterior wall that preheats ventilation air. The trade name of the collector is Conserval Solarwall, usually referred to as Solarwall. Solarwall comes in three configurations: a glazed wall; a perforated metal wall (High Performance Solarwall); and a perforated metal wall that ties into a canopy (Canopy Solarwall).

This section presents evaluations of the application of Solarwall to five buildings at Fort Carson. In each case the existing conditions were determined by inspection of the building construction, mechanical systems, hours of operation, and measurement of the space vertical air temperature profile. A concept for applying one of the Solarwall configurations was developed that would integrate the retrofit system into the building without adversely impacting the current mission. The concept was then evaluated by calculating the avoided utility energy consumed as the result of the energy gained through the Solarwall, and the energy saved by reducing wall heat losses and exhaust air heat losses.

All five buildings were inspected by EMC engineers on a sunny afternoon, the 27th of January, 1993. The outdoor temperature was in the low fifties, the sun was shining, and the wind was very light. Building managers were interviewed at the two gymnasiums.

Appendix B contains product literature and calculations for this section.

3.2 BUILDING P-1160: GYMNASIUM

Existing Conditions: The building is open for use 94 hours per week. Use of the basketball gymnasium varies from just a few individuals during the day to group usage and team play after the daily work shift. The need for ventilation in the main gym is not great during the work day.

Wall construction is 4 inch brick on rigid insulating board on 8 inch concrete masonry block. The east, south and west walls of the gym are effective passive solar walls. South and west exterior wall surface temperatures were measured at 100°F. Roof construction is a 3-ply built-up roof on 3 inches of rigid insulation on a steel deck.

Two unit ventilators mounted on the east wall and two mounted on the west wall provide 6,000 cfm of heated makeup air when the building is in operation and the outside temperature is 40°F or below. Exhaust fans are interlocked to the unit ventilators to insure air balance. Four destratification fans run during building operating hours, and are effective in reducing temperature stratification. The building manager has manual control of the unit ventilators and the exhaust fans, should he desire to operate them.

The hot water coils are supplied with medium temperature water supplied by the central heating plant via a heat exchanger.

The building temperature is well controlled. Air temperature at five feet above the floor was measured at 65°F and ceiling air temperature was measured at 68°F. Air temperature stratification is not a problem in this building.

The makeup air heating load on this building is not large. The use of time clocks and the careful attention of the building manager are effective in maintaining good comfort conditions and reducing the run time of the mechanical system. Seldom are there many persons on the gym floor at once, so the need for ventilation is minimal. Also, the brick walls absorb solar heat which eliminates heat loss during most of the daylight hours and well into the evening. Roof surface temperature was not measured, but is very likely above ambient air temperatures when the sun is shining on it. With an R-11 roof and little temperature stratification, roof heat loss is not excessive.

Proposed Retrofit Concept: A High Performance Solarwall is to be installed on the west wall, and ducted so as to connect to the existing outside air intake ducts on the two unit ventilators mounted on the west wall. The installation would require modification of the existing intakes on the unit ventilators. Solarwall would function as a preheater for the existing makeup air system. The Solarwall analysis and backup data are presented in Appendix B.

Results of Analysis:

Inputs:	Ventilation rate	6,000	cfm
	Solar wall area	1,111	sqft
	Collector efficiency	65	%
	System unit cost	$17.88	/sqft
	Unit energy price	$3.48	/Mbtu
	Purchased hot water efficiency	70	%
	Economic life	10	yrs
Outputs:	System first cost	$19,867	
	Annual energy savings	107.6	Mbtu
	Annual energy cost savings	$535	
	Simple payback	37.1	yrs
	Energy discount factor	9.51	
	Discounted energy cost savings	$5,089	
	SIR	0.3	
	Internal rate of return	-9.24	%

Conclusions and Recommendations: The existing conditions at this building seriously limit the performance of Solarwall. The lack of significant temperature stratification, the high exterior wall surface temperatures, and the very low number of annual operating hours of the ventilation system limit the potential contribution of solar energy and makes a Solarwall retrofit cost prohibitive. A Solarwall retrofit for this building is not recommended. This particular building is already very energy efficient, well maintained, and properly operated.

3.3 BUILDING P-2357: GYMNASIUM

Existing Conditions: This gymnasium is similar in operation to Building 1160. It operates 94 hours per week with low daytime usage of the basketball gym during the work day.

The building is also of brick and concrete masonry block construction, and the southeast and southwest walls are effective passive solar collectors. Exterior southeast and southwest wall surface temperatures were measured at 96°F.

Four unit ventilators and two exhaust fans serve the basketball gym. They run continuously and have a winter and a summer mode. The outside air dampers on all four units are in the minimum position for winter operation, which is approximately the 25% flow rate position. The winter ventilation rate is 2,825 cfm, which is very low, but adequate for this facility. Exhaust air is balanced to maintain building pressure. There are no destratification fans. The supply air distribution ductwork is very adequate for the basketball gym.

A time clock is installed to control the makeup air and exhaust system, but the pins are removed. Also, the system controls are not accessible to the building manager. As a result, the hot water heating coils operate continuously in the winter months and the gym is overheated. Air temperatures at the floor level were measured at 86°F. Ceiling temperatures were measured at 93°F. Entry doors are frequently opened to increase infiltration in order to cool the gymnasium.

Hot water is provided by the central heating plant via a heat exchanger.

Proposed Retrofit: A Canopy Solarwall is to be installed on the southwest wall, connecting into the two existing makeup air ducts that serve two unit ventilators. It is assumed that before the Canopy Solarwall is installed, the controls on the four unit ventilators would be repaired, the time clock operation would be restored, and an outside temperature lockout control would be installed on the unit ventilators to shut them off at ambient temperatures below 50°F. These repair actions would bring the building conditioning under control, which it should be before a solar system is added.

Results of Analysis:

Inputs:	Ventilation rate	2,825	cfm
	Solar wall area	523	sq ft
	Collector efficiency	65	%
	System unit cost	$17.88	/sqft
	Unit energy price	$3.48	/Mbtu
	Purchased hot water efficiency	70	%
	Economic life	10	yrs
Outputs:	System first cost	$9,354	
	Annual energy savings	126	Mbtu
	Annual energy cost savings	$626	
	Energy discount factor	9.51	
	Discounted energy cost savings	$5,952	/yr
	Simple payback	14.9	yrs

SIR	0.6
Internal rate of return	-0.60 %

Conclusions and Recommendations: The efficiency of the existing wall construction acting as a passive solar wall, coupled with the low ventilation rate and low number of ventilation hours result in a long payback for Solarwall. It is not recommended for this building.

Comment: The existing controls on the unit ventilators should be repaired, the time clocks operation should be restored, and the clock and system controls should be made accessible to the building manager.

3.4 BUILDING P-8030: T.O.E. MAINTENANCE FACILITY

Existing Conditions: This industrial building operates 168 hours per week.

The lower wall construction is concrete masonry block. The upper wall construction is corrugated metal sheet on steel frame with an insulating liner. The metal wall is painted dark grey. South exterior metal wall surface temperatures measured 78°F late on a sunny afternoon. Roof construction is 3-ply built-up roofing on rigid insulation on steel deck. The large overhead doors are not insulated, but fit well.

The building is served by unit ventilators equipped with supply and exhaust fans, hot water coils and heat recovery wheels. The units run 24 hours per day and use 100% outside air. The heat recovery wheels transfer heat from the exhaust stream to the make up air stream when they are operational. The air system exhausts air from both ceiling and floor areas through the heat recovery wheels. The building is equipped with extensive supply and exhaust air ductwork. Air distribution is excellent.

Hot water is provided by the central heating plant via heat exchangers.

At the time of the building inspection, many of the overhead doors were open, which is frequently the case, especially when the wind velocity is low and the sun is shining. Ceiling and floor level air temperatures were measured at 64°F in the vicinity of the doors.

The operation of the ventilation system without the heat recovery wheels results in excessive hot water usage to heat the large volume of fresh air that is taken into the building. It is assumed that the heat recovery wheels would be repaired before the Solarwall is constructed.

Proposed Retrofit: A Canopy Solarwall is to be mounted on the upper south wall above the overhead doors on the three south sections of the building. The Solarwall would be ducted into the make up air intakes on the three unit ventilators.

The northwest and northeast sections of the building are not good candidates for Solarwall because of the location of the mechanical equipment rooms with respect to the south walls of these building sections. The make up air intakes for these building sections are on the north walls.

Results of Analysis:

Inputs:	Ventilation rate	153,000	cfm
	Solar wall area	14,160	sq ft
	Collector efficiency	65	%
	System unit cost	$17.88	/sq ft
	Unit energy price	$3.48	/MBtu
	Purchased hot water efficiency	70	%
	Economic life	10	yrs
Outputs:	System first cost	$253,181	
	Annual energy savings	957	MBtu
	Annual energy cost savings	$4,727	
	Simple payback	54	yrs
	Energy discount factor	9.51	
	Discounted energy cost savings	$44,955	
	SIR	0.2	
	Internal rate of return	-12.51	%

Conclusions and Recommendations: The heat recovery wheels and the Solarwall are not compatible, in that the installation of the Solarwall seriously degrades the effectiveness of the heat recovery wheels. The combined result is a very small decrease in hot water coil load, and does not justify the installation of a Solarwall. In fact, the heat recovery wheel and Solarwall have similar performance characteristics. Both act as preheaters for the make up air. Both have performance efficiency of about 70%. However, the heat wheel is even more effective at night than it is in the daytime, because of the lower night ambient temperatures. The heat wheel also reduces the losses of exhausting stratified hot air in the building by recovering much of the heat from the exhaust air stream.

The current annual gas cost of operating the 3 unit ventilators in the south bays with the heat recovery wheels inoperative is $92,904. Repair of the heat recovery wheels would reduce the cost for gas to $28,138, for an annual savings of $64,766. Adding Solarwall would further reduce the annual gas cost to $23,410 for an additional annual savings of only $4,727 per year.

Installation of Solarwall on P-8030 is not recommended.

Comment: The annual gas cost to operate the ventilation system in the entire building without Solarwall and with the heat recovery wheels inoperative is $173,408 at the current price of gas. This is the current situation. If the heat recovery wheels were repaired on all seven unit ventilators, the annual gas cost would drop to $57,300, which would produce an annual savings of $116,109. The cost of the repairs would be approximately $14,000.

3.5 BUILDING P-8142: VEHICLE MAINTENANCE FACILITY

Existing Conditions: This industrial building used for vehicle maintenance operates from 0700 to 1600 hrs on weekdays.

The building is similar in wall and roof construction to Building P-8030. Exterior metal walls are painted light grey, and surface temperatures on the south exterior walls measured 98°F. At the time of the survey, most of the overhead doors were open and all heating was off. Floor slab temperatures were measured at 61°F, and ceiling temperatures were also measured at 61°F.

There are two bays: a west bay (north-south axis), and an east bay (east-west axis). Both are served by unit ventilators with hot water coils with make up air intakes located on the roof. Several hot water fan coil units provide space heat. These units are controlled by thermostats set for 65°F, but have on-off switches which are shut off when the overhead doors are open. A manually controlled vehicle exhaust air system is operated when needed. It exhausts air from the floor level. The existing supply air distribution system is excellent.

Proposed Retrofit:

The two high bay areas were inspected for application of Solarwall. It is proposed to construct a Canopy Solarwall on the south wall of each of the two bays, to provide preheated air for the unit ventilators.

Results of Analysis:

Inputs:	Ventilation rate	9,120	cfm
	Solar wall area	1,689	sq ft
	Collector efficiency	65	%
	System unit cost	$17.88	/sq ft
	Unit energy price	$3.48	/MBtu
	Purchased hot water efficiency	70	%
	Economic life	10	yrs
Outputs:	System first cost	$30,197	
	Annual energy savings	231	MBtu
	Annual energy cost	$1,146	
	Simple payback	26.3	yrs
	Energy discount factor	9.51	
	Discounted energy cost savings	$10,900	
	SIR	0.4	
	Internal rate of return	-6.08	%

Conclusions and Recommendations: The low operating hours of the unit ventilators is the main reason Solarwall is not cost effective for this building. The absence of strong temperature stratification also reduces the effectiveness of Solarwall. It is not recommended for implementation on Building P-8142.

3.6 BUILDING P-8300: D/S MAINTENANCE FACILITY

Existing Conditions: This industrial vehicle maintenance building operates from 0700 to 1600 hrs on weekdays.

Wall and roof construction are similar to the construction of Building P-8030, except that the exterior walls are painted blue. The exterior south metal wall surface temperature was measured at 78°F.

At the time of the building inspection, the overhead doors were open and all air systems were off. The maintenance bay floor slab temperature was measured at 63°F, and the ceiling air temperature was measured at 70°F.

The building has a west bay and an east bay that were inspected for application of Solarwall. Each bay is served by a single heat and vent unit equipped with a medium temperature hot water coil. The make up air intake is on the roof. The existing supply and exhaust air ducting is quite extensive and is very adequate. Hot water fan coil units provide space heat when the overhead doors are not open. They are controlled by wall-mounted thermostats set for 65°F.

Proposed Retrofit: A Canopy Solarwall is proposed for the east bay, where connection to the heat and vent unit make up air intake is easily made. Installation on the west bay would require an insulated air duct to run 150 feet on the roof to reach the make up air intake of the heat and vent unit.

Results of Analysis:

Inputs:	Ventilation rate	26,420	cfm
	Solar wall area	2,172	sq ft
	Collector efficiency	65	%
	System unit cost	\$17.88	/sq ft
	Unit energy price	\$3.48	/MBtu
	Purchased hot water efficiency	70	%
	Economic life	10	yrs
Outputs:	System first cost	\$38,835	
	Annual energy savings	325	MBtu
	Annual energy cost savings	\$1,617	
	Simple payback	24.0	yrs
	Energy discount factor	9.51	
	Discounted energy cost savings	\$15,377	
	SIR	0.4	
	Internal rate of return	-5.20	%

Conclusions and Recommendations: Solarwall is not cost effective for this building and is not recommended. Again, the operating hours are insufficient, and the absence of large stratification heat savings negatively impacts the performance of Solarwall.

SECTION 4.0

UPDATE OF ECO ANALYSES

4.1 ECO 13: MOTOR REPLACEMENT

This ECO applies to 38 buildings, and includes 141 motors. Motor operational status was determined by inspection. Each motor was inspected for general condition, nameplate data was taken, and the motor operating schedule was obtained from the building manager. This information was checked against the same data acquired in the 1985 study by Forster-Morrell Engineering Assoc., Inc. For many buildings the data was the same. A few motors have been replaced in the interim period. Motors which have not been replaced in the interim period are assumed to have a remaining economic life of five years.

Motor efficiency was estimated for each motor surveyed, and the annual kWh consumption and kW demand were calculated. Then the same calculations were made for high efficiency motors of the same size. Efficiencies for the replacement motors were taken as the average of high efficiency motor efficiencies from three motor manufacturers. Energy savings and reduction in demand were then calculated for each replacement motor. High efficiency motor purchase and installation costs were based on vendor prices and Means Mechanical Cost Data 1993.

The results of the analysis are presented in Tables 4-1 and 4-2. LCCA summary sheets, calculations, and backup data are included in Appendix C, Tab 1.

TABLE 4-1
ECO 13: ENERGY SAVINGS SUMMARY

Motor Size (HP)	Number of Motors	Electric Energy Savings (kWh)	Reduced Electrical Demand (kW)
1/2	12	7,199	1.35
3/4	17	5,925	1.26
1	8	3,282	0.65
1-1/2	13	7,482	1.50
2	10	8,786	1.31
3	10	12,718	2.05
5	29	63,182	8.77
7-1/2	13	31,151	4.87
10	13	29,201	5.26
15	2	7,846	1.19
20	2	5,054	1.22
25	4	18,030	2.74
30	2	9,384	1.43
40	6	38,207	5.82
Total	141	247,447	39.42

TABLE 4-2
ECO 13: ECONOMIC SUMMARY

Motor Size (HP)	No. of Motors	Elec. Energy ($/yr)	Elec. Demand ($/yr)	Invest. Cost ($)	Simple Payback (yrs)	SIR	AIRR %
1/2	12	180	94	3,089	7.8	1.91	7.41
3/4	17	148	88	4,616	11.1	1.37	5.65
1	8	82	45	3,549	14.2	1.08	4.39
1-1/2	13	187	105	5,952	12.0	1.26	5.19
2	10	220	91	4,767	10.0	1.50	6.14
3	10	318	143	4,966	7.4	2.00	7.67
5	29	1,580	611	15,141	5.4	2.74	9.38
7-1/2	13	789	339	9,083	6.1	2.43	8.71
10	13	730	367	10,122	6.8	2.17	8.11
15	2	196	83	2,184	6.1	2.43	8.72
20	2	126	85	2,642	8.5	1.75	6.95
25	4	451	191	6,783	7.7	1.93	7.48
30	2	235	100	3,989	8.4	1.77	7.02
40	6	955	406	15,536	8.1	1.83	7.20
All Motors	141	6,196	2,747	92,418	7.4	2.00	7.66

Conclusions and Recommendations: Replacement of standard motors with high efficiency motors is cost effective for motor sizes of 1/2 HP or greater, providing the annual operating hours exceed approximately 4000. Simple payback varies from 5.4 to 14.2 years, depending on motor size and hours of use.

For the entire group of 141 motors, the investment cost of $92,418 has a simple payback of 7.4 years with an SIR of 2.0.

It is recommended that the motors included in this study be replaced with high efficiency motors as soon as funds are available. Certainly it is clear from the results of this study that a policy of replacing standard motors with high efficiency motors should be implemented at Fort Carson. This will reduce the electrical demand, save energy, increase motor service life, and lower maintenance costs over the life of the motors.

4.2 ECO 14: NIGHT SETBACK THERMOSTATS

Eight buildings were analyzed for this ECO. The building conditions and systems are the same today as they were in 1985 for buildings P-1007, P-1955 and P-2700. New conditions exist at buildings P-1956, P-2055, P-2056, P-2155 and P-2156, which are all similar to P-1955. Computer simulations were performed for the primary building, P-1955.

Results of the evaluations are shown in Table 4-3. LCCA summary sheets and backup data are included in Appendix C, Tab 2.

TABLE 4-3
ECO 14: SUMMARY OF RESULTS

Bldg. No.	Electric Energy Savings (MBtu/yr)	Gas Energy Savings (MBtu/yr)	Investmt Cost ($)	Electric Cost Savings ($/yr)	Gas Cost Savings ($/yr)	SPB (yrs)	SIR	AIRR %
P-1007	22.0	331	1,120	377	1,151	0.7	18.5	26.3
P-1955	0	160	373	0	557	0.7	21.1	27.5
P-1956	0	160	373	0	557	0.7	21.1	27.5
P-2055	0	65	373	0	228	1.6	8.6	20.1
P-2056	0	160	373	0	557	0.7	21.1	27.5
P-2155	0	160	373	0	557	0.7	21.1	27.5
P-2156	0	160	373	0	557	0.7	21.1	27.5
P-2700	0	1,435	2,614	0	4,988	0.5	27.0	29.6
ALL BLDGS	22.0	2,631	5,974	377	9,150	0.6	22.4	28.0

__Conclusions and Recommendations:__ Each of the 8 buildings qualify for implementation of ECO 14 with an SIR >1.25. The economic benefit is very large for the small investment cost with SPB ranging from 0.5 to 1.6 years, and SIR ranging from 27.09 to 8.6. It is recommended that ECO 14 be implemented as soon as funding permits, with a high priority.

4.3 ECO 16: DRY BULB AIR ECONOMIZERS

Buildings P-1850 and P-2359 were reanalyzed for this ECO. Both buildings are chapels. The schedules of religious services and the thermostat schedules have changed since 1985. Both buildings were analyzed in 1985.

P-2359 is served by two air handlers, one of which already has an economizer. AHU-2 serves the administrative area and is not equipped with an economizer. It was analyzed for ECO 16.

P-1850 is served by a single air handler which is not equipped with an economizer. It was analyzed for ECO 16.

In both BCEP simulations the minimum outside air settings were taken from the current ASHRAE standard for ventilation requirements. The results are presented in Table 4-4. LCCA summary sheets and backup data are included in Appendix C, Tab 3.

TABLE 4-4
ECO 16: SUMMARY OF RESULTS

Bldg. No.	Electric Energy Savings (MBtu/yr)	Gas Energy Savings (MBtu/yr)	Investmt Cost ($)	Electric Cost Savings ($/yr)	Gas Cost Savings ($/yr)	SPB (yrs)	SIR	AIRR %
P-1850	0	223.1	5,776	0	775	7.4	2.5	8.9
P-2359	0	84.7	2,921	0	294	9.9	1.9	7.3
ALL BLDGS	0	307.8	8,697	0	1,070	8.1	2.3	8.4

Conclusions and Recommendations: ECO 16 is medium cost effective for both buildings and should be implemented as soon as funding permits.

4.4 ECO 19: AUTOMATIC RADIATOR CONTROLS

Twenty buildings are listed in the SOW to be reevaluated for this ECO. It was determined at the time of the field inspections that Building P-6233 is scheduled to be demolished, and that steam radiators in buildings P-6234 and P-6253 have been removed and air systems have been installed. Consequently, only 17 buildings were included in the reevaluation of ECO 19.

The proposed retrofit is to install a control valve on each radiator, connected to a wall mounted thermostat by a capillary tube. No electrical power is required.

Since 1985, each of the buildings has been modified with double pane windows, and all of the buildings are being converted from medical clinics to administrative type uses. Both the building use schedules and construction have changed, so new energy savings calculations were made. The two primary buildings, P-6220 and P-6230 were rerun on the BCEP. The results of analysis are presented in Tables 4-5. LCCA summary sheets and backup data are included in Appendix C, Tab 4.

TABLE 4-5
ECO 19: SUMMARY OF RESULTS

Bldg. No.	Electric Energy Savings (MBtu/yr)	Gas Energy Savings (MBtu/yr)	Investmt Cost ($)	Electric Cost Savings ($/yr)	Gas Cost Savings ($/yr)	SPB (yrs)	SIR	AIRR %
S-6220	0	412	7,526	0	1,433	5.3	2.7	11.1
S-6221	0	193	4,487	0	672	6.7	2.1	9.4
S-6222	0	641	14,184	0	2,229	6.4	2.2	9.7
S-6223	0	319	10,566	0	1,110	9.5	1.5	6.8
S-6224	0	819	25,039	0	2,846	8.8	1.6	7.4
S-6236	0	667	21,710	0	2,317	9.4	1.5	6.9
S-6237	0	746	21,710	0	2,592	8.4	1.7	7.7
S-6243	0	850	14,908	0	2,955	5.0	2.8	11.4
S-6230	0	591	17,079	0	2,056	8.3	1.7	7.8
S-6231	0	554	14,908	0	1,924	7.7	1.8	8.3
S-6235	0	554	14,908	0	1,924	7.7	1.8	8.3
S-6240	0	551	17,224	0	1,914	9.0	1.6	7.2
S-6241	0	554	14,908	0	1,924	7.7	1.8	8.3
S-6244	0	590	11,579	0	2,052	5.6	2.5	10.6
S-6252	0	590	15,921	0	2,049	7.8	1.8	8.3
S-6254	0	554	14,908	0	1,924	7.7	1.8	8.3
S-6255	0	691	22,434	0	2,404	9.3	1.5	6.9
ALL BLDGS	0	9,875	263,997	0	34,325	7.7	1.8	8.3

Conclusions and Recommendations: ECO 19 is medium cost effective, with SPB ranging from a low of 5.0 years to a high of 9.5 years. However, each of the 17 buildings qualify with an SIR >1.25. Taken as a single project for all 17 buildings, the investment cost is $263,997 with an SPB of 7.7, SIR of 1.8 and an AIRR of 8.3%. It is recommended that ECO 19 be implemented as a single project when funds are available.

4.5 RECOMMENDATIONS WITH REGARD TO ECIP PROJECTS

Table 4-6 on the following page presents the results for all of the buildings in each ECO, and for the four ECOs grouped into a single project. The LCCA for the group of all ECOs is in Appendix C, Tab 5.

TABLE 4-6
PRIORITIZED ECO SUMMARY

ECO No.	Electric Energy Savings (MBtu/yr)	Gas Energy Savings (MBtu/yr)	Investmt Cost ($)	Electric Cost Savings ($/yr)	Gas Cost Savings ($/yr)	SPB (yrs)	SIR	AIRR %
14	22	2,631	5,974	377	9,145	0.6	22.4	28.0
16	0	308	8,697	0	1,070	8.1	2.3	8.4
13	846	0	92,418	8,944	0	7.4	2.0	7.7
19	0	9,875	263,997	0	34,325	7.7	1.8	8.3
ALL ECOs	868	12,814	371,086	9,104	53,645	6.5	2.7	9.4

The total investment cost of all qualifying ECOs is $367,106, which exceeds the $300,000 ECIP project threshold limit. Therefore, it is possible to submit the 4 qualifying ECOs as an ECIP project without combining them with other energy projects at Fort Carson. However, the total project SPB of 6.5 years is marginally competitive. It is recommended that cost effective energy conservation projects already identified in other projects, such as for Evans Army Hospital, be combined with those from this study into a single ECIP project to reduce the SPB. This would improve the probability of obtaining ECIP funding. For such an ECIP project it would be necessary to reevaluate the economic effectiveness of the Evans Hospital ECOs using the current ECIP guidance. Program documentation would have to be prepared for the ECIP project.

SECTION 5.0

HEATING AND COOLING EQUIPMENT DISCREPANCIES

5.1 GENERAL

Buildings designated for inspection of the condition of the heating and cooling equipment and controls are listed in Table 1-1 on page 1-3. These buildings are scheduled for installation of a Utility Control System (UCS), which will result in the replacement of conventional pneumatic and electric temperature controls with Direct Digital Controls (DDC). The existing pneumatic or electric actuated coil control valves and modulating air dampers will remain as presently configured. All other temperature control elements will be replaced.

The inspections were limited to determining the general condition of the heating and cooling equipment, control valves and actuators, and dampers and damper actuators, the purpose being to identify the repairs necessary to make the equipment fully functional when the DDC systems are installed. The performance of a DDC system is only as good as the performance of the dampers and valves in the system.

5.2 INSPECTION PROCEDURES

The barracks buildings are served by fan coil units which receive hot and chilled water from the central heating and cooling plant. The emphasis of the inspections in these buildings was in the mechanical rooms, where heat exchangers and control valves are located for the building heating water and chilled water loops. Condition of piping insulation, valves and valve actuators, outside temperature reset controls, pumps, motors and flange gaskets was determined.

In the other buildings, air handlers serve the various spaces. Each AHU was inspected visually for general condition to include the operational status of dampers and coil control valves, the condition of damper and valve actuators, fan belt tension (noticeable slippage), and filter condition. Fan motor nameplate data were also recorded.

All data were recorded as corrections on the 1985 field survey forms, and changes in condition were noted. The survey forms are located in Appendix D.

It was determined that most of the control valves are original, and near the end of their service lives. Some valves are leaking, and some are badly corroded. Others appeared to be in good condition. However, valves that are near the limit of the specified service life (usually 15 years), are apt to have hysteresis, which will defeat the precise control of flow rates that DDC can provide. Therefore, it is recommended that all control valves be replaced regardless of the apparent condition.

5.3 REPAIR COST ESTIMATES

Control discrepancies for each equipment item were identified and are indicated on the survey data sheets in Appendix D. Unit labor and material cost estimates were made for the repair of each discrepancy, and from these the cost of repair for units in each building was estimated. The principal source for material and labor prices is the Means Mechanical Cost Data 1993. Labor rates are adjusted to the Colorado Springs area. Cost estimates are included in Appendix D.

The total estimated cost for repairing the inspected equipment is $320,236, which includes 20% contingency.

APPENDIX A

SCOPE OF WORK
CONFIRMATION NOTICES

May 1992
Revised
August 19, 1992 (1)
January 20, 1993 (2)

GENERAL SCOPE OF WORK

FOR

UPDATING an EXISTING

ENERGY STUDY

Performed as part of the

ENERGY ENGINEERING ANALYSIS PROGRAM (EEAP)

SCOPE OF WORK
FOR UPDATING AN
EXISTING ENERGY STUDY

TABLE OF CONTENTS

1. BRIEF DESCRIPTION OF WORK: The Architect-Engineer (AE) shall:

1.1 Review the previously completed Energy Engineering Analysis Program (EEAP) study which applies to the specific buildings, systems, or energy conservation opportunities (ECO) covered by this study.

1.2 Perform a limited site survey of specific buildings or areas to collect all data required to evaluate the specific ECOs included in this study.

1.3 Reevaluate the specific projects or ECOs from the previous study to determine its economic feasibility based on revised criteria, current site conditions and technical applicability.

1.4 Evaluate specific ECOs to determine their energy savings potential and economic feasibility.

1.5 Provide project documentation for recommended ECOs as detailed herein.

1.6 Prepare a comprehensive report to document all work performed, the results and all recommendations.

2. GENERAL

2.1 This study is limited to the evaluation of the specific buildings, systems, or ECOs listed in Annex A, DETAILED SCOPE OF WORK.

2.2 The information and analysis outlined herein are considered to be minimum requirements for adequate performance of this study.

2.3 The "Energy Conservation Investment Program (ECIP) Guidance", described in letter from CEHSC-FU, dated 28 June 1991 and the latest revision from CEHSC-FU establishes criteria for ECIP projects and shall be used for performing the economic analyses of all ECOs and projects. The program, Life Cycle Cost In Design (LCCID), has been developed for performing life cycle cost calculations in accordance with ECIP guidelines and is referenced in the ECIP Guidance. If any program other than LCCID is proposed for life cycle cost analysis, it must use the mode of calculation specified in the ECIP Guidance. The output must be in the format of the ECIP LCCA summary sheet, and it must be submitted for approval to the Contracting Officer.

2.4 Energy conservation opportunities determined to be technically and economically feasible shall be developed into projects acceptable to installation personnel. This may involve combining

similar ECOs into larger packages which will qualify for ECIP, MCA, or PCIP funding, and determining in coordination with installation personnel the appropriate packaging and implementation approach for all feasible ECOs.

2.4.1 Projects which qualify for ECIP funding shall be identified, separately listed, and prioritized by the Savings to Investment Ratio (SIR).

2.4.2 All feasible non-ECIP projects shall be ranked in order of highest to lowest SIR.

2.4.3 At some installations Energy Conservation and Management (ECAM) funding will be used instead of ECIP funding. The criteria for each program is the same. The Director of Engineering and Housing will indicate which program is used at this installation. This Scope of Work mentions only ECIP, however, ECAM is also meant.

3. PROJECT MANAGEMENT

3.1 Project Managers. The AE shall designate a project manager to serve as a point of contact and liaison for work required under this contract. Upon award of this contract, the individual shall be immediately designated in writing. The AE's designated project manager shall be approved by the Contracting Officer prior to commencement of work. This designated individual shall be responsible for coordination of work required under this contract. The Contracting Officer will designate a project manager to serve as the Government's point of contact and liaison for all work required under this contract. This individual will be the Government's representative.

3.2 Installation Assistance. The Commanding Officer or authorized representative at the installation will designate an individual to assist the AE in obtaining information and establishing contacts necessary to accomplish the work required under this contract. This individual will be the installation representative.

3.3 Public Disclosures. The AE shall make no public announcements or disclosures relative to information contained or developed in this contract, except as authorized by the Contracting Officer.

3.4 Meetings. Meetings will be scheduled whenever requested by the AE or the Contracting Officer for the resolution of questions or problems encountered in the performance of the work. The AE's project manager and the Government's representative shall be required to attend and participate in all meetings pertinent to the work required under this contract as directed by the Contracting Officer. These meetings, if necessary, are in addition to the presentation and review conferences.

3.5 Site Visits, Inspections, and Investigations. The AE shall visit and inspect/investigate the site of the project as

necessary and required during the preparation and accomplishment of the work.

3.6 Records

3.6.1 The AE shall provide a record of all significant conferences, meetings, discussions, verbal directions, telephone conversations, etc., with Government representative(s) relative to this contract in which the AE and/or designated representative(s) thereof participated. These records shall be dated and shall identify the contract number, and modification number if applicable, participating personnel, subject discussed and conclusions reached. The AE shall forward to the Contracting Officer within ten calendar days, a reproducible copy of the records.

3.6.2 The AE shall provide a record of requests for and/or receipt of Government-furnished material, data, documents, information, etc., which if not furnished in a timely manner, would significantly impair the normal progression of the work under this contract. The records shall be dated and shall identify the contract number and modification number, if applicable. The AE shall forward to the Contracting Officer within ten calendar days, a reproducible copy of the record of request or receipt of material.

3.7 Interviews. The AE and the Government's representative shall conduct entry and exit interviews with the Director of Engineering and Housing before starting work at the installation and after completion of the field work. The Government's representative shall schedule the interviews at least one week in advance.

3.7.1 Entry. The entry interview shall describe the intended procedures for the survey and shall be conducted prior to commencing work at the facility. As a minimum, the interview shall cover the following points:

a. Schedules.

b. Names of energy analysts who will be conducting the site survey.

c. Proposed working hours.

d. Support requirements from the Director of Engineering and Housing.

3.7.2 Exit. The exit interview shall briefly describe the items surveyed and probable areas of energy conservation. The interview shall also solicit input and advice from the Director of Engineering and Housing.

4. SERVICES AND MATERIALS. All services, materials (except those specifically enumerated to be furnished by the Government), plant, labor, supervision and travel necessary to perform the work and render the data required under this contract are included in the lump sum price of the contract.

5. PROJECT DOCUMENTATION. All energy conservation opportunities which the AE has considered shall be included in one of the following categories and presented in the report as such:

5.1 ECIP Projects. To qualify as an ECIP project, an ECO, or several ECOs which have been combined, must have a construction cost estimate greater than $300,000, a Savings to Investment Ratio greater than one and a simple payback period of less than eight years. For ECAM projects, the $300,000 limitation may not apply; in such cases, the AE shall check with the installation for guidance. The overall project and each discrete part of the project shall have an SIR greater than one. All projects meeting the above criteria shall be arranged as specified in paragraph 2.7.1 and shall be provided with programming documentation. Programming documentation shall consist of a DD Form 1391, life cycle cost analysis (LCCA) summary sheet(s) (with necessary backup data to verify the numbers presented), and a Project Development Brochure (PDB). A life cycle cost analysis summary sheet shall be developed for each ECO and for the overall project when more than one ECO are combined. The energy savings for projects consisting of multiple ECOs must take into account the synergistic effects of the individual ECOs. [For projects and ECOs reevaluated from previous studies, the backup data shall consist of copies of the original calculations and analysis, with new pages revising the original calculations and analysis. In addition, the backup data shall include as much of the following as is available: the increment of work under which the project or ECO was developed in the previous study, title(s) of the project(s), the energy to cost (E/C) ratio, the benefit to cost (B/C) ratio, the current working estimate (CWE), and the payback period. The purpose of this information is to provide a means to prevent duplication of projects in any future reports.]

5.2 Non-ECIP Projects. Projects which do not meet ECIP criteria with regard to cost estimate, payback period, or non-energy (75%) qualification test, but which have an SIR greater than one shall be documented. Projects or ECOs in this category shall be arranged as specified in paragraph 2.7.2 and shall be provided with the following documentation: the life cycle cost analysis (LCCA) summary sheet completely filled out, a description of the work to be accomplished, backup data for the LCCA, ie, energy savings calculations and cost estimate(s), and the simple payback period. The energy savings for projects consisting of multiple ECOs must take into account the synergistic effects of the individual ECOs. In addition these projects shall have the necessary documentation prepared, as required by the Government's representative, for one of the following categories:

a. Quick Return on Investment Program (QRIP). This program is for projects which have a total cost greater than $3,000 but less than $100,000 and a simple payback period of two years or less.

b. Productivity Enhancing Capital Investment Program (PECIP).

This program is for projects which have a total cost of greater than $3,000 but lees than $100,000 and a simple payback period of four years or less.

c. OSD Productivity Investment Funding (OSD PIF). This program is for projects which have a total cost of more than $100,000 and a simple payback period of four years or less.

The above programs and the required documentation forms are all described in detail in AR 5-4, Change No. 1.

d. Regular Military Construction Army (MCA) Program. This program is for projects which have a total cost greater than $300,000 and a simple payback period of four to twenty-five years. Documentation shall consist of DD Form 1391 and a Project Development Brochure.

e. Low Cost/No Cost Projects. These are projects which the Director of Engineering and Housing (DEH) can perform using his resources. Documentation shall be as required by the DEH.

5.3 Nonfeasible ECOs. All ECOs which the AE has considered but which are not feasible, shall be documented in the report with reasons and justifications showing why they were rejected.

6. DETAILED SCOPE OF WORK. The Detailed Scope of Work is contained in Annex A.

7. WORK TO BE ACCOMPLISHED.

7.1 Review Previous Studies. Review the previous EEAP study which applies to the specific buildings, systems, or ECOs covered by this study. This review should acquaint the AE with the work that has been performed previously. Much of the information the AE may need to develop the ECOs in this study is contained in the previous study.

7.2 Perform a Limited Site Survey. The AE shall obtain all necessary data to evaluate the ECOs or projects by conducting a site survey. However, the AE is encouraged to use any data that may have been documented in a previous study. The AE shall document his site survey on forms developed for the survey, or standard forms, and submit these completed forms as part of the report. All test and/or measurement equipment shall be properly calibrated prior to its use.

7.3 Reevaluate Selected Projects. The AE shall reevaluate the projects and ECOs listed in Annex A. These are projects and ECOs that the previous study has identified but that have not been accomplished or only parts have been accomplished. If the project or ECO is acceptable as is, that is, there are no changes to the basic project or ECO, the energy savings shown in the previous project may be accepted as accurate but the energy cost and construction cost estimates shall be updated based on the most current data available. With the above information the project shall

then be analyzed based on current ECIP criteria. If the project or ECO is basically acceptable but some of the buildings in the original project have been deleted or new buildings can be added, the necessary changes shall be made to the energy savings, the energy costs and construction costs shall be updated, and the revised project or ECO shall then be analyzed using current ECIP guidance. If the original project or ECO has had numerous changes made to it so that all of the numbers are suspected of being inaccurate, but the project or ECO is still considered feasible, the AE shall develop the project from the beginning and analyze it with the current ECIP guidance. These projects shall be separately listed in the report.

7.4 Evaluate Selected ECOs. The AE shall analyze the ECOs listed in Annex A. These ECOs shall be analyzed in detail to determine their feasibility. Savings to Investment Ratios (SIRs) shall be determined using current ECIP guidance. The AE shall provide all data and calculations needed to support the recommended ECO. All assumptions and engineering equations shall be clearly stated. Calculations shall be prepared showing how all numbers in the ECO were figured. Calculations shall be an orderly step-by-step progression from the first assumption to the final number. Descriptions of the products, manufacturers catalog cuts, pertinent drawings and sketches shall also be included. A life cycle cost analysis summary sheet shall be prepared for each ECO and included as part of the supporting data.

7.5 Combine ECOs Into Recommended Projects. During the Interim Review Conference, as outlined in paragraph [7.6.1], the AE will be advised of the DEH's preferred packaging of recommended ECOs into projects for implementation. Some projects may be a combination of several ECOs, and others may contain only one. These projects will be evaluated and arranged as outlined in paragraphs 5.1, 5.2, and 5.3. Energy savings calculations shall take into account the synergistic effects of multiple ECOs within a project and the effects of one project upon another. The results of this effort will be reported in the Final Submittal per par [7.6.2].

7.6 Submittals, Presentations and Reviews. The work accomplished shall be fully documented by a comprehensive report. The report shall have a table of contents and shall be indexed. Tabs and dividers shall clearly and distinctly divide sections, subsections, and appendices. All pages shall be numbered. Names of the persons primarily responsible for the project shall be included. The AE shall give a formal presentation of the interim submittal to installation, command, and other Government personnel. Slides or view graphs showing the results of the study to date shall be used during the presentation. During the presentation, the personnel in attendance shall be given ample opportunity to ask questions and discuss any changes deemed necessary to the study. A review conference will be conducted the same day, following the presentation. Each comment presented at the review conference will be discussed and resolved or action items assigned. It is anticipated that the presentation and review conference will require approximately one working day. The presentation and review

conference will be at the installation on the date agreeable to the Director of Engineering and Housing, the AE and the Government's representative. The Contracting Officer may require a resubmittal of any document(s), if such document(s) are not approved because they are determined by the Contracting Officer to be inadequate for the intended purpose.

7.6.1 Interim Submittal. An interim report shall be submitted for review after the field survey has been completed and an analysis has been performed on all of the ECOs. The report shall indicate the work which has been accomplished to date, illustrate the methods and justifications of the approaches taken and contain a plan of the work remaining to complete the study. Calculations showing energy and dollar savings, SIR, and simple payback period of all the ECOs shall be included. The results of the ECO analyses shall be summarized by lists as follows:

a.All ECOs eliminated from consideration shall be grouped into one listing with reasons for their elimination as discussed in par 5.3.

b.All ECOs which were analysed shall be grouped into two listings, recommended and non-recommended, each arranged in order of descending SIR. These lists may be subdivided by building or area as appropriate for the study. The AE shall submit the Scope of Work and any modifications to the Scope of Work as an appendix to the report. A narrative summary describing the work and results to date shall be a part of this submittal. At the Interim Submittal and Review Conference, the Government's and AE's representatives shall coordinate with the Director of Engineering and Housing to provide the AE with direction for packaging or combining ECOs for programming purposes and also indicate the fiscal year for which the programming or implementation documentation shall be prepared. The survey forms completed during this audit shall be submitted with this report. The survey forms only may be submitted in final form with this submittal. They should be clearly marked at the time of submission that they are to be retained. They shall be bound in a standard three-ring binder which will allow repeated disassembly and reassembly of the material contained within.

7.6.2 Prefinal Submittal. The AE shall prepare and submit the prefinal report when all sections of the report are 100% complete and all comments from the interim submittal have been resolved. The AE shall submit the Scope of Work for the study and any modifications to the Scope of Work as an appendix to the submittal. The report shall contain a narrative summary of conclusions and recommendations, together with all raw and supporting data, methods used, and sources of information. The report shall integrate all aspects of the study. The recommended projects, as determined in accordance with paragraph 5, shall be presented in order of priority by SIR. The lists of ECOs specified in paragraph [7.6.1] shall also be included for continuity. The prefinal report and all appendices shall be bound in standard three-ring binders which will allow repeated disassembly and reassembly. The prefinal report shall be

arranged to include:

a. An Executive Summary to give a brief overview of what was accomplished and the results of this study using graphs, tables and charts as much as possible (See Annex B for minimum requirements).

b. The narrative report describing the problem to be studied, the approach to be used, and the results of this study.

c. Documentation for the recommended projects (includes LCCA Summary Sheets).

d. Appendices to include as a minimum:

1) Energy cost development and backup data

2) Detailed calculations

3) Cost estimates

4) Computer printouts (where applicable)

5) Scope of Work

7.6.3 Final Submittal. Any revisions or corrections resulting from comments made during the review of the prefinal report shall be incorporated into the final report. These revisions or corrections may be in the form of replacement pages, which may be inserted in the prefinal report, or complete new volumes. Pen and ink changes or errata sheets will not be acceptable. If replacement pages are to be issued, it shall be clearly stated with the prefinal submittal that the submitted documents will be changed only to comply with the comments made during the review of the prefinal and that the volumes issued at the time of the prefinal submittal should be retained. Failure to do so will require resubmission of complete volumes. If new volumes are submitted, they shall be in standard three-ring binders and shall contain all the information presented in the prefinal report with any necessary changes made. Detailed instructions of what to do with the replacement pages should be securely attached to the replacement pages.

ANNEX A

Detailed Scope of Work
for
Updating an Existing Energy Study
Fort Carson, Colorado

1. This Annex contains the detailed Scope of Work for this energy study. The study shall be accomplished in accordance with the General Scope of Work and Annexes A, B, C, and D.

2. Programming Documentation. This study will update two Programming Documentations that were part of the Energy Survey Opportunities Survey (Modified), Final Report for Fort Carson, Colorado, dated October 1985. The two Programming Documentations are Heating, Ventilation, and Air Conditioning Energy Conservation Improvements to Permanent Buildings (ECIP) and Mechanical and Electrical Energy Conservation Improvements to Permanent Buildings (ECIP). The updating of these projects will only include some of the originally studied ECOs as shown in Tables 1 and 2. Also a solar-wall, which was not previously
studied, will now be studied for five buildings. The Building (2)
numbers are P-1160, P-2357, P-8030, P-8142, and P-8300. This (2)
study shall emphasis the Low Cost/No Cost Projects as described (2)
in Paragraph 5.2,e. in the General Scope of Work. (2)

3. Government Furnished Data. The following data and criteria is furnished for guidance and information.

a. Energy Savings Opportunity Survey (Modified), Fort Carson, Colorado, Dated October 1985, Volume 1, Book 1, and Volume 1, Book 5. This is available from Mr. Steve Snyder, Fort Carson, Colorado, phone (719)579-3678.

b. Architectural and Engineering Instructions, Design Criteria, dated 14 July 1989, Revised on May 1991.

c. TM5-785 Engineering Weather Data, pages: cover, IV, V, 1-X, 3-68, 3-69, and 5-5.

d. AR5-4, Change No. 1, Department of the Army Productivity Improvement Program.

e. Energy Conservation Investment Program (ECIP) Guidance, dated 28 June 1991, w/o enclosure 2.

f. CEMP-EC/CEMP-ET Memorandum, dated 10 December 1991, Subject: Economic Studies for MCA and MCAF Designs.

g. AR415-15, 1 January 1984, Military Construction, Army (MCA) Program Development.

h. Tri-Service Military Construction Program (MCP) Index, dated February 1991.

4. Life Cycle Costing Computer Program. A computer program titled Life Cycle Costing in Design (LCCID) is available from the BLAST Support Office in Urbana, Illinois for a nominal fee. This computer program can be used for performing the economic calculations for ECIP and non-ECIP ECOs. The AE is encouraged to obtain and use this computer program. The BLAST Support Office can be contacted at 144 Mechanical Engineering Building, 1206 West Green Street, Urbana, Illinois 61801. The telephone number is (217)333-3977 or (800)842-5278.

5. Project Coordinators at the Installation. The Fort Carson coordinator in the Directorate of Engineering and Housing for this study is Mr. Frank Lyons, phone (719)579-2856/5662. The Fort Carson coordinator in the Directorate of Environmental Compliance and Management is Mr. Steve Snyder, phone (719)579-3678. Their addresses are shown in Annex D.

6. Copies of Report Required. The number of copies for each addressee shall be as shown in Annex D. All copies shall be sent directly to the addresses as shown in Annex D.

7. Schedule for Study.

	Calendar Days From Notice To Proceed	
a. Interim Submittal:	195 days	(1)(2)
b. Government's Review:	225 days	(1)(2)
c. Prefinal Submittal:	255 days	(1)(2)
d. Government's Review:	285 days	(1)(2)
e. Final Submittal Corrected:	300 days	(1)(2)

8. Scheduling and Reporting Progress. The Contractor shall prepare and submit an activity diagram or schedule, which will indicate individual activities, significant events and milestones along with schedule dates. The schedule shall cover the entire scope and work period of the contract. In addition, the Contractor shall submit monthly reports of progress. These reports shall be in letter and chart form and should be worded or keyed to indicate progress on the activity diagram and shall describe work accomplished in the immediate past and work to be done in the immediate future. Monthly reports shall be sent to the addressees numbered 4,6, and 8 as shown in Annex D.

TABLE 1 - ECOs to Apply

Project to Update: Heating, Ventilation, and Air Conditioning Energy Conservation Improvements to Permanent Buidings (ECIP).

ECO #	Name	
14	Night Setback.	
16	Economizer Cycle.	
19	Radiator Controls.	
		(1)
		(2)
31	List HVAC Controls that need to be repaired or replaced so Ft Carson can do this work.	(2) (2) (2)

BLDG #	ECO 14	ECO 16	ECO 19	ECO 31	SIMILARITY	(1)(2) (1)(2)
P-1007	X			X	PRIMARY	
P-1150				X	S to 1007	(2)
P-1118				X	PRIMARY	
P-1217				X	I to 1118	
P-1218				X	I to 1118	
P-1219				X	I to 1118	
P-1220				X	I to 1118	
P-1363				X	S to 1118	
P-1364				X	I to 1363	
P-1365				X	I to 1363	
P-1366				X	I to 1363	
P-1367				X	I to 1363	
P-1664				X	I to 1363	
P-1665				X	I to 1363	
P-1666				X	I to 1363	
P-1667				X	I to 1363	
P-1227				X	PRIMARY	
P-1446				X	PRIMARY	
P-1526				X	PRIMARY	
P-1528				X	PRIMARY	
P-1855				X	PRIMARY	(2)
P-1864				X	PRIMARY	

(1)
(1)
(1)
(1)

(1)
(1)

BLDG #	ECO 14	ECO 16	ECO 19	ECO 31	SIMILARITY	(2) (2)
						[illegible]
						(1)
						(1)
						(1)
						(1)
						(1)
						(1)
						(1)
						(1)
						(1)
						(1)
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						(1)
						(1)
						(1)
						(1)
						(1)
						(1)
						(1)
						(1)
P-1955	X				PRIMARY	
P-1956	X			X	I to 1955	
P-2055	X			X	I to 1955	
P-2056	X			X	I to 1955	
P-2155	X			X	I to 1955	
P-2156	X			X	I to 1955	
P-1957				X	PRIMARY	
P-1958				X	I to 1957	
P-2057				X	S to 1957	
P-2058				X	I to 2057	
P-2157				X	I to 2057	
P-2158				X	I to 2057	
P-2257				X	I to 2057	
P-2258				X	S to 1957	
P-2457				X	S to 1957	
P-2458				X	I to 2457	
P-2557				X	I to 2457	
P-2558				X	I to 2457	
P-2350				X	PRIMARY	(2)
P-1853				X	S to 2350	(2)
P-2060				X	I to 1853	(2)
P-2160				X	I to 1853	(2)

BLDG #	ECO 14	ECO 16	ECO 19	ECO 31	SIMILARITY	(2) (2)
P-2352				X	I to 2350	
P-2700	X			X	S to 2350	
P-2357				X	PRIMARY	
P-1856				X	S to 2357	
P-2359		X		X	PRIMARY	(2)
P-1850		X		X	I to 2359	(2)
S-6220			X		PRIMARY	
S-6221			X		I to 6220	(1)
S-6222			X		I to 6220	(1)
S-6223			X		I to 6220	(1)
S-6224			X		I to 6220	(1)
S-6233			X		I to 6220	(1)
S-6236			X		I to 6220	(1)
S-6237			X		I to 6220	(1)
S-6243			X		I to 6220	(1)
S-6230*			X		PRIMARY	
S-6231			X		I to 6230	(1)
S-6234			X		I to 6230	(1)
S-6235			X		I to 6230	(1)
S-6240			X		I to 6230	(1)
S-6240			X		I to 6230	(1)
S-6241			X		I to 6230	(1)
S-6244			X		I to 6230	(1)
S-6252			X		I tO 6230	(1)
S-6253			X		I to 6230	(1)
S-6254			X		I tO 6230	(1)
S-6255			X		I to 6230	(1)
P-8000				X	PRIMARY	(1)
P-8030				X	PRIMARY	(1)
P-8142				X	PRIMARY	(1)

* Building #S-6230, ECO 19, was not included in the programming documentation in the original study, but was analyzed and the results shown in Volume 1, Book 3, Page N-591 of the original study.

TABLE 2 - ECOs to Apply

Project to Update: Mechanical and Electrical Energy Conservation Improvements to Permanent Buildings (ECIP).

ECO #	Name	
13	High Efficiency Motors.	
31	List HVAC Controls that need to be repaired	(2)
	or replaced so Ft Carson can do this work.	(2)

BLDG	ECO 13	ECO 31	SIMILARITY	(2) (2)
P-1950	X	X	PRIMARY	(2)
P-2070	X	X	I to 1950	(2)
P-2153	X	X	I to 1950	(2)
P-2250	X	X	I to 1950	(2)
P-1951	X	X	PRIMARY	(2)
P-1952	X	X	I to 1951	(2)
P-1953	X	X	I to 1951	(2)
P-1954	X	X	I to 1951	(2)
P-2050	X	X	I to 1951	(2)
P-2051	X	X	I to 1951	(2)
P-2052	X	X	I to 1951	(2)
P-2054	X	X	I to 1951	(2)
P-2071	X	X	I to 1951	(2)
P-2072	X	X	I to 1951	(2)
P-2073	X	X	I to 1951	(2)
P-2074	X	X	I to 1951	[illegible]
P-2150	X	X	I to 1951	[illegible]
P-2151	X	X	I to 1951	(2)
P-2152	X	X	I to 1951	(2)
P-2154	X	X	I to 1951	(2)
P-2251	X	X	I to 1951	(2)
P-2252	X	X	I to 1951	(2)
P-2253	X	X	I to 1951	(2)
P-2254	X	X	I to 1951	(2)
P-2450	X	X	S to 1951	(2)
P-2451	X	X	I to 2450	(2)
P-2452	X	X	I to 2450	(2)
P-2453	X	X	I to 2450	(2)
P-2454	X	X	I to 2540	(2)
P-2350	X	X*	PRIMARY	(2)
P-1853	X	X*	S to 2350	(2)
P-2060	X	X*	I to 1853	(2)
P-2160	X	X*	I to 1853	(2)
P-2352	X	X*	I to 2350	(2)
P-2700	X	X*	S to 2350	(2)
P-8000	X	X*	PRIMARY	(2)
P-8030	X	X*	PRIMARY	(2)
P-8142	X	X*	PRIMARY	(2)

* Shown also on Table 1.

ANNEX B

EXECUTIVE SUMMARY GUIDELINE

1. Introduction.

2. Building Data (types, number of similar buildings, sizes, etc.)

3. Present Energy Consumption of Buildings or Systems Studied.

    o Total Annual Energy Used.

    o Source Energy Consumption.

        Electricity - KWH, Dollars, BTU
        Fuel Oil - GALS, Dollars, BTU
        Natural Gas - THERMS, Dollars, BTU
        Propane - GALS, Dollars, BTU
        Other - QTY, Dollars, BTU

4. Reevaluated Projects Results.

5. Energy Conservation Analysis.

    o ECOs Investigated.

    o ECOs Recommended.

    o ECOs Rejected. (Provide economics or reasons)

    o ECIP Projects Developed. (Provide list)*

    o Non-ECIP Projects Developed. (Provide list)*

    o Operational or Policy Change Recommendations.

* Include the following data from the life cycle cost analysis summary sheet: the cost (construction plus SIOH), the annual energy savings (type and amount), the annual dollar savings, the SIR, the simple payback period and the analysis date.

6. Energy and Cost Savings.

    o Total Potential Energy and Cost Savings.

    o Percentage of Energy Conserved.

    o Energy Use and Cost Before and After the Energy Conservation Opportunities are Implemented.

ANNEX C

REQUIRED DD FORM 1391 DATA

To facilitate ECIP project approval, the following supplemental data shall be provided:

a. In title block clearly identify projects as "ECIP."

b. Complete description of each item of work to be accomplished including quantity, square footage, etc.

c. A comprehensive list of buildings, zones, or areas including building numbers, square foot floor area, designated temporary or permanent, and usage (administration, patient treatment, etc.).

d. List references, and assumptions, and provide calculations to support dollar and energy savings, and indicate any added costs.

(1) If a specific building, zone, or area is used for sample calculations, identify building, zone or area, category, orientation, square footage, floor area, window and wall area for each exposure.

(2) Identify weather data source.

(3) Identify infiltration assumptions before and after improvements.

(4) Include source of expertise and demonstrate savings claimed. Identify any special or critical environmental conditions such as pressure relationships, exhaust or outside air quantities, temperatures, humidity, etc.

e. Claims for boiler efficiency improvements must identify data to support present properly adjusted boiler operation and future expected efficiency. If full replacement of boilers is indicated, explain rejection of alternatives such as replace burners, nonfunctioning controls, etc. Assessment of the complete existing installation is required to make accurate determinations of required retrofit actions.

f. Lighting retrofit projects must identify number and type of fixtures, and wattage of each fixture being deleted and installed. New lighting shall be only of the level to meet current criteria. Lamp changes in existing fixtures is not considered an ECIP type project.

g. An ECIP life cycle cost analysis summary sheet as shown in the ECIP Guidance shall be provided for the complete project and for each discrete part included in the project. The SIR is applicable to all segments of the project. Supporting documentation consisting of basic engineering and economic calculations showing how savings were determined shall be included.

h. The DD Form 1391 face sheet shall include, for the complete project, the annual dollar and MBTU savings, SIR, simple amortization period and a statement attesting that all buildings and retrofit actions will be in active use throughout the amortization period.

i. The calendar year in which the cost was calculated shall be clearly shown on the DD Form 1391.

j. For each temporary building included in a project, separate documentation is required showing (1) a minimum 10-year continuing need, based on the installation's annual real property utilization survey, for active building retention after retrofit, (2) the specific retrofit action applicable and (3) an economic analysis supporting the specific retrofit.

k. Nonappropriated funded facilities will not be included in an ECIP project without an accompanying statement certifying that utility costs are not reimbursable.

l. Any requirements required by ECIP guidance dated 25 April 1988 and any revisions thereto. Note that unescalated costs/savings are to be used in the economic analyses.

m. The five digit category number for all ECIP projects except for Family Housing is 80000. The category code number for Family Housing projects is 71100.

ANNEX D
Distribution Address List for Report

1. Commander
U.S. Army Engineer District, Mobile
ATTN: CESAM-EN-CC (T. Battaglia)
P.O. Box 2288
Mobile, AL 36628-0001
1 Copy of Corrected Final

2. HQDA
ATTN: DALO-TSE (LTC H. Corley)
Pentagon
Washington, D.C. 20310-0561
1 Copy of Executive Summary

3. Commander
U.S. Army Corps of Engineers
ATTN: CEMP-ET (H. Torabi)
20 Massachusetts Avenue, NW
Washington, D.C. 20314-1000
1 Copy of Executive Summary

4. Commander
HQ FORSCOM
ATTN: FCEN-RDF-K (N. Kapur)
Fort McPherson, GA 30330-6000
1 Copy

5. Commander
U.S. Army Engineer Division, Missouri River
ATTN: CEMRD-MD-MA (J. Whelchel)
P.O. Box 103, Downtown Station
Omaha, NE 68102-4978
1 Copy

6. Commander
U.S. Army Engineer District, Omaha
ATTN: CEMRO-ED-ME (S. Owens)
215 North 17th Street
Omaha, NE 68102-4978
3 Copies

7. Commander
HQS, Fort Carson & HQS, 4th Infantry Div. (Mech)
ATTN: AFZC-FE-ME (F. Lyons)
Building 304
Fort Carson, CO 80913-5023
2 Copies

8. Commander
HQS, Fort Carson & HQS, 4th Infantry Div. (Mech)
ATTN: AFZC-ECM-EM (S. Snyder)
Building 302
Fort Carson, CO 80913-5023
2 copies

CONFIRMATION NOTICE

Confirmation No.: 4 EMC #2101-001

DATE: 1 March 1993
To/From: Stan Owen
Representing: Omaha District Corps of Engineers

PROJECT: Updating an Existing Energy Study, Ft. Carson, CO
CONTRACT No.: DACA 45-91-D-0009

NOTICE PREPARED BY: Eric J. Young
E M C Engineers, Inc.

SUBJECT: Scope of Work

The following is a summary of the items discussed, comments, and decisions made during the meeting at Stan Owen's office.

The Scope of Work was revised on 20 January 1993 and has been reviewed, and the following is the result of the revision:

1. ECO 31 (HVAC Controls) was redefined to require EMC to identify needed control system component repairs to make the HVAC systems ready to receive the UCS system being designed under another contract.

   The new DDC controls will interface with the existing control valve and damper actuators. All other control elements will be replaced under the new design. We will review the condition of the existing actuators.

   There were 29 buildings added to the ECO 31 list that will require survey.

2. Buildings 8000, 8030 and 8142 were added to ECO 13 (High Eff. Motors), which requires more survey and analysis work. There are many motors in these buildings.

3. The number of buildings to be analyzed for solar wall concept was increased from three to five.

The effects of these changes in the Scope of Work on the original proposed effort are as follows:

1. The potential for packaging ECOs in an ECIP project that have synergistic interactions has been eliminated by the redefinition of ECO 31 since there are no longer several differing ECOs impacting the same energy system.

2. The cost of implementing the new group of ECOs is much less than the original program that included energy savings from ECO 31, and it is very unlikely that the remaining ECOs together will reach $300,000. (If two of the solar wall buildings had qualified for retrofit, the $300,000 would have been reached, but none qualified).

Other recent changes have impacted the contract, and are:

1. The cost of natural gas at Ft. Carson is lower now than in 1985 when the first ECIP study was completed, and construction costs are higher. The SIRs are worse now than previously on ECOs where heating is involved (ECO 14, ECO 19).

2. The new ECIP guidelines have changed the economic life of the various ECOs from 25 years to 15 years, or even 10 years, which also adversely impacts the SIR for the ECOs.

Therefore, the modification of the Scope of Work will mean:

1. ECOs 13, 14, 16, and 19 will probably qualify for implementation, but will not total enough in cost to qualify for ECIP funding. They will most likely have to be done under the OMA program budget.

2. ECO 31 is no longer an ECO since there are no energy savings involved in repairing dampers and damper and valve actuators. What is involved is restoring the mechanical systems to the intended baseline or design condition.

3. In view of no.'s 1 and 2 above, the usual prefinal phase activities below are unnecessary:

   - Package ECO for implementation under ECIP/QRIP/OSO-PIF/PECIP programs.

   - Redetermine the cost effectiveness of each ECO as part of the package.

   - Prepare program documentation for each package.

The engineering costs of performing the new work under the modified Scope of Work is estimated to be the same as performing the prefinal work as negotiated in our contract.

We recommend the following action, and have received concurrence of Stan Owen to proceed as follows:

> Eliminate the entire prefinal phase submittal of the project since there is no longer a purpose for the submittal. Substitute the additional work in the Revised Scope of Work that includes 29 additional buildings for ECO 31, three additional buildings for ECO 13, and two additional buildings for the solar wall study. EMC will not provide any program documentation.

Eric J. Young

EJY/sgh(26)

If any portion of this confirmation notice is incorrect, please notify us immediately. If correspondence is not received to the contrary within 14 days, it will be assumed that the decisions and conclusions, and status outline in this confirmation notice is correct.

CONFIRMATION NOTICE

Confirmation No.: 3 EMC #2101-001

DATE: 7 December 1992
To/From: Stan Owen
Representing: Omaha District Corps of Engineers

PROJECT: Updating an Existing Energy Study, Ft. Carson, CO
CONTRACT No.: DACA 45-91-D-0009

NOTICE PREPARED BY: Eric J. Young
E M C Engineers, Inc.

SUBJECT: Scope of Work

The following is a summary of the items discussed, comments, and decisions made during the telephone conversation.

During the last several weeks, it has been determined that another project substantially overlaps this project in scope. That project is the Utility Control System Upgrade, conducted by the Huntsville Division Corps of Engineers for the Ft. Carson site. The project is being designed by Newcomb Boyd Engineers and Consultants in Atlanta, Georgia. We have been in contact with representatives of that firm to determine the overlap.

The overlap in scope appears to be in the control work indicated in ECO 31 and ECO 14 of our scope of work, and could affect the recommendations for ECO #13.

Buildings that should be deleted from ECO 31 in our contract because of overlap include:

P-1118	P-2350	P-2357
P-1217	P-1853	P-1856
P-1218	P-2060	P-8000
P-1219	P-2160	P-8030
P-1526	P-2352	P-8142
P-1528		

Buildings in which partial deletion from ECO 31 should be considered for our contract due to the overlap include:

P-1957	P-2157	P-2457
P-1958	P-2158	P-2458
P-2057	P-2257	P-2557
P-2058	P-2258	P-2558

Building that should be deleted from ECO #14 in our contract because of overlap include:

P-2350	P-2060	P-2160
P-1853		

At least 17 of the 35 buildings listed for ECO #13 are impacted by the overlap in reduced motor run times. Possibly 17 additional buildings will be impacted, but this is unknown at this time. Only Building P-2700 is not impacted.

There are six additional buildings that should be confirmed in the scope of work, buildings that may be slated for demolition. No clear direction has been received on these buildings. They are:

P-1220	P-1364	P-1366
P-1363	P-1365	P-1367

The buildings listed above represent a substantial portion of the work under this contract. Deleting the buildings above would drastically reduce the size of the study we are conducting. Unfortunately, a substantial portion of our work has already been expended on the buildings that should be deleted, including: the field investigation; and portions of the technical analysis, economical analysis, and cost estimates. Completion of those tasks and the interim report for those buildings has not yet been expended.

In reviewing the above overlap, it was determined by Stan Owen and Eric Young that the project should be stopped at this point, and put on temporary hold until a modification to the contract redirection our effort can be issued. The interim report will not be submitted as scheduled.

I mentioned to Stan Owen that Will White at Ft. Carson possibly has several other buildings and ECOs he is interested in adding to the scope. Any modification should include those buildings if desired.

A request for modification to change the scope to delete Building 8000 from the solar wall study, and to add Buildings 8300, 1160, and 2351 to the solar wall studies has not yet been received. A modification to the contract should also include this change.

Eric J. Young

EJY/sgh(15)

If any portion of this confirmation notice is incorrect, please notify us immediately. If correspondence is not received to the contrary within 14 days, it will be assumed that the decisions and conclusions, and status outline in this confirmation notice is correct.

CONFIRMATION NOTICE

Confirmation No.	003	EMC #2102-001
DATE:	23 Nov. 92	
PROJECT: CONTRACT NO:	Fort Carson EEAP Update DACA45-91-D-0009	
NOTES PREPARED BY:	T. FORSTER	
DATE OF CONFERENCE:	22 Nov 92	
PLACE OF CONFERENCE:	Ft. Carson AFZC-EMC office	
SUBJECT:	Interim Report Format and Content	
ATTENDANTS:	Steve Snyder,AFZC-EMC R. W. White, AFZC-EMC T.Forster, EMC Engineers, Inc.	

T. Forster presented a summary of the project goals, and an outline for the format and content of the interim and prefinal reports. These items were reviewed and accepted by R. White and S. Evans. Forster presented a recommended format for the building survey forms which was reviewed and accepted (attachment #1).

The overlap of the current UCS design project and ECO 31 of this contract was discussed. R. White provided UCS design drawings for Delivery Orders #2 and #3 to Forster for used in determining the exact points that will be included in the UCS design. Forster agreed that EMC would determine the extent of conflict between this contract and the "UCS project, and advise AFZC-EMC as soon as possible.

R. White delivered to EMC the October 1992 amendment to the NBS Handbook for LCCA, and a copy of a CERL Lighting Technology paper.

APPENDIX B

BACKUP DATA
CONSERVAL SOLARWALL

SOLAR WALL EVALUATION
FORT CARSON
BUILDING 1160
Gymnasium

VENTILATION RATE	VENT	6,000	cfm
WALL AREA	AREA	1,111	ft2
COLLECTOR EFFICIENCY	EFF	65%	
AIR HEAT CONTENT	CP	0.83	Btuh/F/cfm
DAYS PER WEEK	DAYS	5	
SYSTEM COST	FIRST	17.88	$/ft2
ENERGY COST	COST	3.48	$/MBTU
BOILER EFFICIENCY	BOIL	70%	

MONTH	DAYS	DAILY SOUTH WALL INSOL Btu/ft2	BASE 40 DEGREE DAYS F-days	AMBIENT TEMP F	SOLAR HEAT MBtu	HEATING LOAD MBtu	SOLAR FRACTION
JAN	31	1421	356	29	23	30	75%
FEB	28	1384	273	31	20	23	86%
MAR	31	1223	207	35	18	18	100%
APR	30	940	77	46	7	7	100%
MAY	31	696	29	56	2	2	100%
JUN	30	610	0	65	0	0	0%
JUL	31	647	0	71	0	0	0%
AUG	31	831	0	69	0	0	0%
SEP	30	1170	0	61	0	0	0%
OCT	31	1438	72	50	6	6	100%
NOV	30	1379	146	38	12	12	100%
DEC	31	1227	302	31	20	26	76%
YR	365	1080.5	1,461		108	125	86%

ESTIMATED FIRST COST	$19,867
ANNUAL ENERGY COST SAVINGS	$535
SIMPLE PAYBACK (yrs)	37.1
ENERGY DISCOUNT FACTOR (1)	9.51
DISCOUNTED ENERGY COST SAVINGS	$5,089
SIR	0.3
INTERNAL RATE OF RETURN	-9.24%

(1) Natural gas, 4% discount rate, 10 year life, Region 4.

SOLAR WALL EVALUATION
FORT CARSON
BUILDING 2357
Gymnasium

VENTILATION RATE	VENT	2,825	cfm
WALL AREA	AREA	523	ft2
COLLECTOR EFFICIENCY	EFF	65%	
AIR HEAT CONTENT	CP	0.83	Btuh/F/cfm
DAYS PER WEEK	DAYS	7	
SYSTEM COST	FIRST	17.88	$/ft2
ENERGY COST	COST	3.48	$/MBTU
BOILER EFFICIENCY	BOIL	70%	

MONTH	DAYS	DAILY SOUTH WALL INSOL Btu/ft2	BASE 65 DEGREE DAYS F-days	AMBIENT TEMP F	SOLAR HEAT MBtu	HEATING LOAD MBtu	SOLAR FRACTION
JAN	31	1421	1,116	29	15	63	24%
FEB	28	1384	952	31	13	54	25%
MAR	31	1223	930	35	13	52	25%
APR	30	940	572	46	10	32	30%
MAY	31	696	302	56	7	17	43%
JUN	30	610	118	65	6	7	93%
JUL	31	647	79	71	4	4	100%
AUG	31	831	87	69	5	5	100%
SEP	30	1170	181	61	10	10	100%
OCT	31	1438	470	50	15	26	57%
NOV	30	1379	810	38	14	46	31%
DEC	31	1227	1,054	31	13	59	22%
YR	365	1080.5	6,671		126	375	34%

ESTIMATED FIRST COST	$9,354
ANNUAL ENERGY COST SAVINGS	$626
SIMPLE PAYBACK (yrs)	14.9
ENERGY DISCOUNT FACTOR (1)	9.51
DISCOUNTED ENERGY COST SAVINGS	$5,952
SIR	0.6
INTERNAL RATE OF RETURN	-0.60%

(1) Natural gas, 4% discount rate, 10 year life, Region 4.

S8030BAS.XLS

SOLAR WALL EVALUATION
FORT CARSON
BUILDING 8030
Maintenance Shop

BASELINE - Heat wheel operational

VENTILATION RATE	VENT	153,000 cfm
WALL AREA	AREA	14,160 ft2
COLLECTOR EFFICIENCY	EFF	0%
AIR HEAT CONTENT	CP	0.83 Btuh/F/cfm
DAYS PER WEEK	DAYS	7
SYSTEM COST	FIRST	17.88 $/ft2
ENERGY COST	COST	3.48 $/MBTU
HEAT WHEEL EFFECTIVENESS	HWE	71%
AVERAGE SOLAR TEMP RISE (24 HRS)		0
ROOM TEMPERATURE	ROOM	64
BOILER EFFICIENCY	BOIL	70%

MONTH	DAYS	DAILY SOUTH WALL INSOL Btu/ft2	BASE 64 DEGREE DAYS F-days	AMBIENT TEMP F	SOLAR HEAT MBtu	HEAT WHEEL MBtu	GAS HEAT MBtu	VENT HEATING LOAD MBtu	SOLAR FRACTION
JAN	31	1421	1,085	29	0	2,348	959	3,307	0%
FEB	28	1384	924	31	0	1,999	817	2,816	0%
MAR	31	1223	899	35	0	1,945	795	2,740	0%
APR	30	940	542	46	0	1,169	484	1,653	0%
MAY	31	696	276	56	0	537	306	843	0%
JUN	30	610	0	65	0	0	0	0	0%
JUL	31	647	0	71	0	0	0	0	0%
AUG	31	831	0	69	0	0	0	0	0%
SEP	30	1170	162	61	0	195	300	495	0%
OCT	31	1438	441	50	0	939	405	1,344	0%
NOV	30	1379	780	38	0	1,688	690	2,378	0%
DEC	31	1227	1,023	31	0	2,214	904	3,118	0%
YR	365	1080.5	6,133		0	13,033	5,660	18,693	0%

BASELINE ANNUAL ENERGY COST	$28,138

SOLAR WALL EVALUATION
FORT CARSON
BUILDING 8030
Maintenance Shop

Solar wall added to system with operational heat wheel

VENTILATION RATE	VENT	153,000	cfm
WALL AREA	AREA	14,160	ft2
COLLECTOR EFFICIENCY	EFF	68%	
AIR HEAT CONTENT	CP	0.83	Btuh/F/cfm
DAYS PER WEEK	DAYS	7	
SYSTEM COST	FIRST	17.88	$/ft2
ENERGY COST	COST	3.48	$/MBTU
HEAT WHEEL EFFECTIVENESS	HWE	71%	
AVERAGE SOLAR TEMP RISE (24 HRS)		3.86	
ROOM TEMPERATURE	ROOM	64	
BOILER EFFICIENCY	BOIL	70%	

MONTH	DAYS	DAILY SOUTH WALL INSOL Btu/ft2	BASE 64 DEGREE DAYS F-days	AMBIENT TEMP F	SOLAR HEAT MBtu	HEAT WHEEL MBtu	GAS HEAT MBtu	VENT HEATING LOAD MBtu	SOLAR FRACTION
JAN	31	1421	1,085	29	424	2,089	794	3,307	13%
FEB	28	1384	924	31	373	1,766	677	2,816	13%
MAR	31	1223	899	35	365	1,687	688	2,740	13%
APR	30	940	542	46	272	918	463	1,653	16%
MAY	31	696	276	56	208	278	357	843	25%
JUN	30	610	0	65	0	0	0	0	0%
JUL	31	647	0	71	0	0	0	0	0%
AUG	31	831	0	69	0	0	0	0	0%
SEP	30	1170	162	61	338	0	157	495	68%
OCT	31	1438	441	50	429	680	234	1,344	32%
NOV	30	1379	780	38	398	1,438	542	2,378	17%
DEC	31	1227	1,023	31	366	1,955	797	3,118	12%
YR	365	1080.5	6,133		3,173	10,811	4,709	18,693	17%

ESTIMATED FIRST COST	$253,181
BASELINE ANNUAL ENERGY COST	$28,138
ANNUAL ENERGY COST	$23,410
ANNUAL ENERGY COST SAVINGS	$4,727
SIMPLE PAYBACK (yrs)	53.6
ENERGY DISCOUNT FACTOR (1)	9.51
DISCOUNTED ENERGY COST SAVINGS	$44,955
SIR	0.2
INTERNAL RATE OF RETURN	-12.51%

(1) Natural gas, 4% discount rate, 10 year life, Region 4.

SOLAR WALL EVALUATION
FORT CARSON
BUILDING 8142/A&B
Maintenance Shop

VENTILATION RATE	VENT	14,625	cfm
WALL AREA	AREA	2,708	ft2
COLLECTOR EFFICIENCY	EFF	65%	
AIR HEAT CONTENT	CP	0.83	Btuh/F/cfm
DAYS PER WEEK	DAYS	5	
HOURS PER DAY	HOURS	10	
SYSTEM COST	FIRST	17.88	$/ft2
ENERGY COST	COST	3.48	$/MBTU
BOILER EFFICIENCY	BOIL	70%	

MONTH	DAYS	DAILY SOUTH WALL INSOL Btu/ft2	BASE 65 DEGREE DAYS F-days	AMBIENT TEMP F	SOLAR HEAT MBtu	HEATING LOAD MBtu	SOLAR FRACTION
JAN	31	1421	1,116	29	55	97	57%
FEB	28	1384	952	31	49	83	59%
MAR	31	1223	930	35	48	81	59%
APR	30	940	572	46	35	50	72%
MAY	31	696	302	56	26	26	100%
JUN	30	610	0	65	0	0	0%
JUL	31	647	0	71	0	0	0%
AUG	31	831	0	69	0	0	0%
SEP	30	1170	181	61	16	16	100%
OCT	31	1438	470	50	41	41	100%
NOV	30	1379	810	38	52	70	74%
DEC	31	1227	1,054	31	48	91	52%
YR	365	1080.5	6,387		370	554	67%

ESTIMATED FIRST COST	$48,425
ANNUAL ENERGY COST SAVINGS	$1,838
SIMPLE PAYBACK (yrs)	26.3
ENERGY DISCOUNT FACTOR (1)	9.51
DISCOUNTED ENERGY COST SAVINGS	$17,480
SIR	0.4
INTERNAL RATE OF RETURN	-6.08%

(1) Natural gas, 4% discount rate, 10 year life, Region 4.

SOLAR WALL EVALUATION
FORT CARSON
BUILDING 8142/E
Maintenance Shop

VENTILATION RATE	VENT	9,120	cfm
WALL AREA	AREA	1,689	ft2
COLLECTOR EFFICIENCY	EFF	65%	
AIR HEAT CONTENT	CP	0.83	Btuh/F/cfm
DAYS PER WEEK	DAYS	5	
HOURS PER DAY	HOURS	10	
SYSTEM COST	FIRST	17.88	$/ft2
ENERGY COST	COST	3.48	$/MBTU
BOILER EFFICIENCY	BOIL	70%	

MONTH	DAYS	DAILY SOUTH WALL INSOL Btu/ft2	BASE 65 DEGREE DAYS F-days	AMBIENT TEMP F	SOLAR HEAT MBtu	HEATING LOAD MBtu	SOLAR FRACTION
JAN	31	1421	1,116	29	35	60	57%
FEB	28	1384	952	31	30	51	59%
MAR	31	1223	930	35	30	50	59%
APR	30	940	572	46	22	31	72%
MAY	31	696	302	56	16	16	100%
JUN	30	610	0	65	0	0	0%
JUL	31	647	0	71	0	0	0%
AUG	31	831	0	69	0	0	0%
SEP	30	1170	181	61	10	10	100%
OCT	31	1438	470	50	25	25	100%
NOV	30	1379	810	38	32	44	74%
DEC	31	1227	1,054	31	30	57	52%
YR	365	1080.5	6,387		231	345	67%

ESTIMATED FIRST COST	$30,197
ANNUAL ENERGY COST SAVINGS	$1,146
SIMPLE PAYBACK (yrs)	26.3
ENERGY DISCOUNT FACTOR (1)	9.51
DISCOUNTED ENERGY COST SAVINGS	$10,900
SIR	0.4
INTERNAL RATE OF RETURN	-6.08%

(1) Natural gas, 4% discount rate, 10 year life, Region 4.

SOLAR WALL EVALUATION
FORT CARSON
BUILDING 8300/C
Maintenance Shop

VENTILATION RATE	VENT	26,420 cfm
WALL AREA	AREA	1,872 ft2
COLLECTOR EFFICIENCY	EFF	65%
AIR HEAT CONTENT	CP	0.83 Btuh/F/cfm
DAYS PER WEEK	DAYS	5
HOURS PER DAY	HOURS	10
SYSTEM COST	FIRST	17.88 $/ft2
ENERGY COST	COST	3.48 $/MBTU
BOILER EFFICIENCY	BOIL	70%

MONTH	DAYS	DAILY SOUTH WALL INSOL Btu/ft2	BASE 65 DEGREE DAYS F-days	AMBIENT TEMP F	SOLAR HEAT MBtu	HEATING LOAD MBtu	SOLAR FRACTION
JAN	31	1421	1,116	29	38	175	22%
FEB	28	1384	952	31	34	149	23%
MAR	31	1223	930	35	33	146	23%
APR	30	940	572	46	25	90	27%
MAY	31	696	302	56	19	47	40%
JUN	30	610	0	65	0	0	0%
JUL	31	647	0	71	0	0	0%
AUG	31	831	0	69	0	0	0%
SEP	30	1170	181	61	28	28	100%
OCT	31	1438	470	50	39	74	53%
NOV	30	1379	810	38	36	127	28%
DEC	31	1227	1,054	31	33	165	20%
YR	365	1080.5	6,387		284	1,000	28%

ESTIMATED FIRST COST	$33,471
ANNUAL ENERGY COST SAVINGS	$1,413
SIMPLE PAYBACK (yrs)	23.7
ENERGY DISCOUNT FACTOR (1)	9.51
DISCOUNTED ENERGY COST SAVINGS	$13,438
SIR	0.4
INTERNAL RATE OF RETURN	-5.07%

(1) Natural gas, 4% discount rate, 10 year life, Region 4.

SOLAR WALL EVALUATION
FORT CARSON
BUILDING 8300/E
Maintenance Shop

VENTILATION RATE	VENT	26,420	cfm
WALL AREA	AREA	2,172	ft2
COLLECTOR EFFICIENCY	EFF	65%	
AIR HEAT CONTENT	CP	0.83	Btuh/F/cfm
DAYS PER WEEK	DAYS	5	
HOURS PER DAY	HOURS	10	
SYSTEM COST	FIRST	17.88	$/ft2
ENERGY COST	COST	3.48	$/MBTU
BOILER EFFICIENCY	BOIL	70%	

MONTH	DAYS	DAILY SOUTH WALL INSOL Btu/ft2	BASE 65 DEGREE DAYS F-days	AMBIENT TEMP F	SOLAR HEAT MBtu	HEATING LOAD MBtu	SOLAR FRACTION
JAN	31	1421	1,116	29	44	175	25%
FEB	28	1384	952	31	39	149	26%
MAR	31	1223	930	35	38	146	26%
APR	30	940	572	46	28	90	32%
MAY	31	696	302	56	22	47	46%
JUN	30	610	0	65	0	0	0%
JUL	31	647	0	71	0	0	0%
AUG	31	831	0	69	0	0	0%
SEP	30	1170	181	61	28	28	100%
OCT	31	1438	470	50	45	74	61%
NOV	30	1379	810	38	42	127	33%
DEC	31	1227	1,054	31	38	165	23%
YR	365	1080.5	6,387		325	1,000	33%

ESTIMATED FIRST COST	$38,835
ANNUAL ENERGY COST SAVINGS	$1,617
SIMPLE PAYBACK (yrs)	24.0
ENERGY DISCOUNT FACTOR (1)	9.51
DISCOUNTED ENERGY COST SAVINGS	$15,377
SIR	0.4
INTERNAL RATE OF RETURN	-5.20%

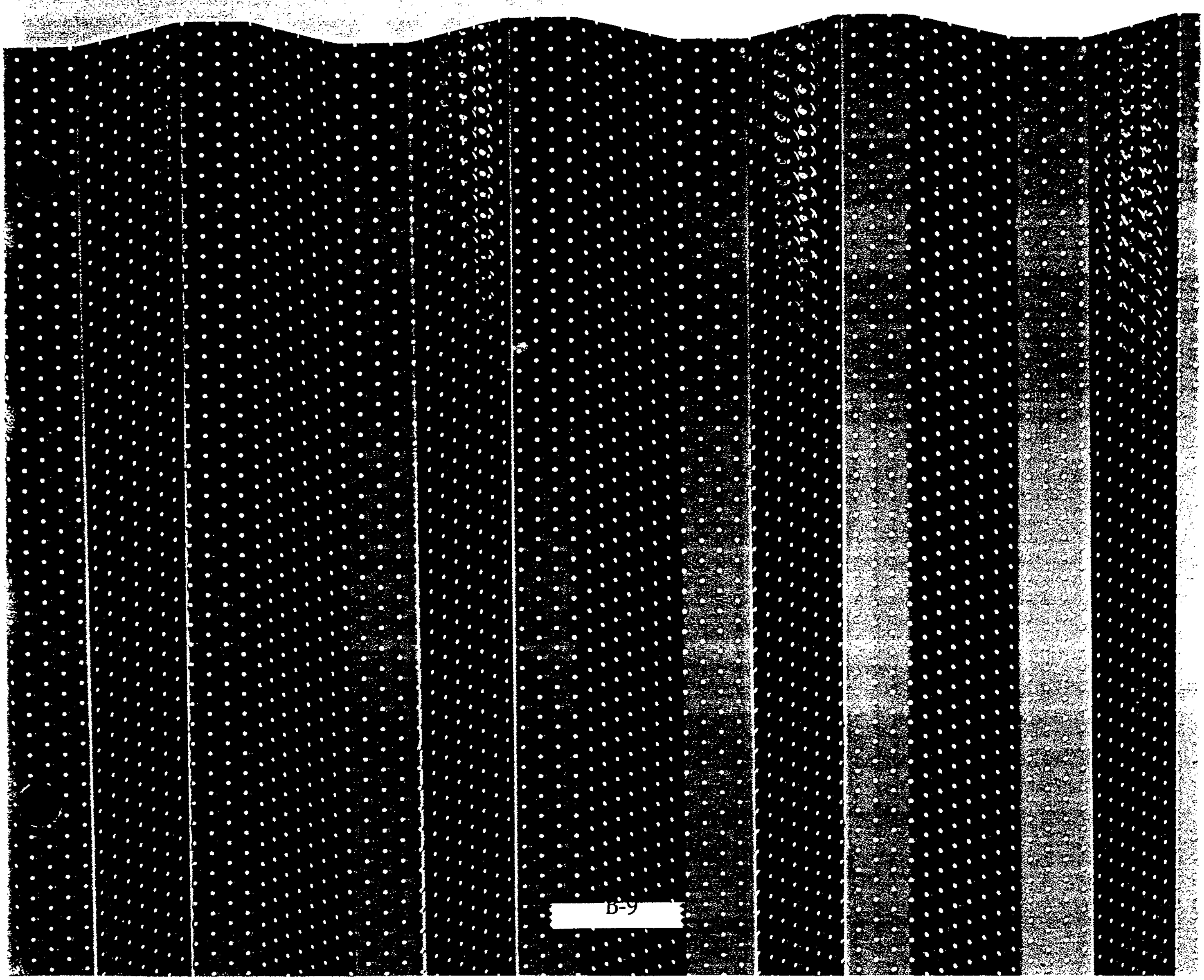
(1) Natural gas, 4% discount rate, 10 year life, Region 4.

07410/CON
BuyLine 6970

Conserval

SOLARWALL®

THE ENERGY PRODUCING WALL CLADDING FOR FRESH AIR HEATING



B-9

SOLARWALL®

CONSERVAL, THE COMPANY

Conserval Engineering Inc. was formed in 1977 by a group of senior engineers having a broad range of experience in the consulting and contracting fields. They pooled their many talents to develop innovative applications of solar heating and energy conservation technologies.

The company adopted a total systems approach to its projects including design, engineering, component fabrication, equipment procurement, installation, operation and service. This single source responsibility allowed Conserval's engineers to develop unique, efficient and reliable products. Now the benefit of this experience is available to all building designers and architects with the extensively tested and field proven SOLARWALL® heater.

The Conserval group of companies and representatives span the USA, Canada and Europe with projects as far away as the South Pole.

MOST ENERGY EFFICIENT WALL

Most walls, even if well insulated, lose heat. The SOLARWALL® system is unique in that the heat loss of the wall is returned back inside the building together with solar heat absorbed by the air. (fig. 3) With virtually zero heat loss plus the heat generated on the wall, the SOLARWALL® has the highest energy efficiency available. Adding insulation to a south wall without the benefit of the SOLARWALL® system may miss half of the potential energy savings. Specify SOLARWALL® for maximum energy efficiency and free heat. Imagine what this means to a building owner - increased revenue from lower heating bills; and to the building designer - an opportunity to be creative while improving the environment and at virtually no additional cost to the Client.

HOW THE SOLARWALL® SYSTEM WORKS

The metal cladding on the walls becomes the heater for outside air entering the building. Dark metal heats up when exposed to the sun. The SOLARWALL® cladding allows this heat to be collected and put to use. Surprisingly, it even works on cloudy days and at night. Diffuse light can account for 25% of the total solar radiation available on a sunny day. At night, if the fan is on, the wall actually becomes a huge heat exchanger with the building heat loss passing through the wall being picked up by the incoming air and brought back into the building. The net result is a wall with an equivalent insulating value of RSI 10 (R 55).

The solar cladding is covered with tiny holes to allow outside air to travel through the face of the cladding. As outside air passes through the panel, it absorbs the solar generated heat. A ventilation fan creates negative pressure in the wall cavity to draw air through the holes. The hot air then rises to the top of the wall by the stack effect, where it is collected in an attractive canopy plenum and ducted to the nearest fan. (fig. 1)

On sunny days the temperature rise over ambient air can be between 17°C to 30°C (30°F to 54°F) depending on air flow rates. On cloudy days or at night, it will function as a preheater with a lower temperature rise.

The premium coatings on the SOLARWALL® cladding are available in several dark colors. Various panel profiles are available from deep grooved shapes which have sufficient internal air space capacity to shallower profiles (see fig. 7) which would be mounted out from the main wall. The canopy plenum provides the cross sectional area necessary to collect the heated air rising up the SOLARWALL® cladding and duct it to ventilation fans which can be inside the building, on the roof or in a penthouse. In systems with a low air flow rate, the top plenum can be incorporated within the SOLARWALL® cladding.

When the SOLARWALL® cladding is applied to industrial buildings with Conserval fan units and distribution ducting, a total energy saving package utilizing solar energy and stratified heat, found near the ceiling, will double or triple the total energy savings and replace the need for fuel burning air make up equipment. Fig. 6 shows a typical solar layout.

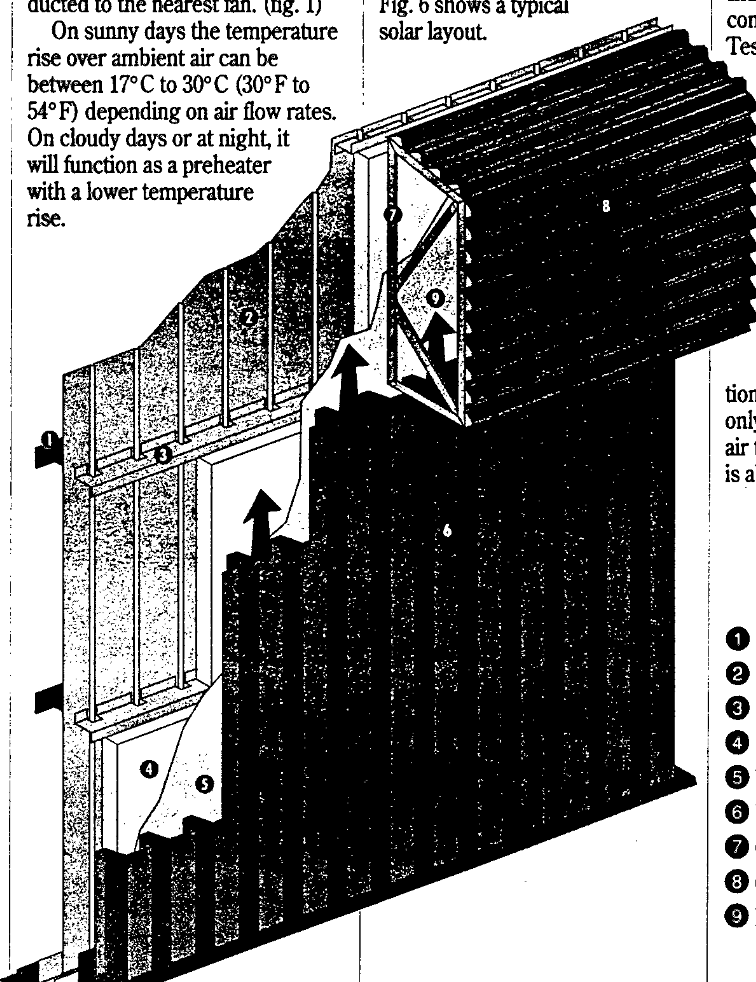
INDOOR AIR QUALITY

Proper ventilation is necessary to maintain a comfortable and healthy indoor environment. During the energy crunch, many people reduced their energy consumption by sealing buildings, making them air tight and then reducing ventilation air. They may have lowered their heating bill, but sometimes at the expense of indoor air quality. The "sick building syndrome" became an issue. One of the best ways of solving this problem according to ASHRAE, is to increase the volume of outside or ventilation air brought into a building. Of course, it requires energy to heat the air. The SOLARWALL® heater can do the job while reducing costs and improving air quality.

HIGHEST SOLAR EFFICIENCY

Independent laboratory tests conducted by the National Solar Test Facility and funded by the Federal Government found the SOLARWALL® to be much more efficient than conventional, air type solar heaters.

SOLARWALL® cladding generates heat even on cloudy days. A small temperature rise of several degrees is useful energy when put to use for preheating outside air. Conventional solar space heating systems only work on sunny days when the air temperature in the solar panel is above room temperature.



1. Building Steel Girt
2. Interior Liner Sheet
3. Notched Z-bar Subgirt
4. Insulation
5. Exterior Liner Sheet
6. Perforated Solar Cladding
7. Canopy Frame
8. Canopy Cladding
9. Heated Air to Fan Unit

Fig. 1

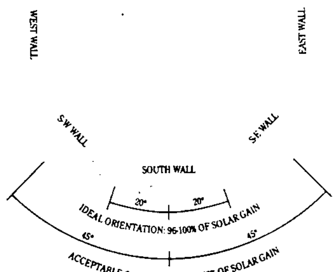


Fig. 2

WEST FACING WALLS RECEIVE 50% OF SOLAR GAIN, FROM 12:00 NOON TO SUNSET

EAST FACING WALLS RECEIVE 50% OF SOLAR GAIN, FROM SUNRISE TO 12:00 NOON

SOLAR ORIENTATION

The ideal location for a SOLARWALL® heater is a south facing wall within 20 degrees east or west of south although any orientation between east and west is suitable. Fig. 2 shows the potential solar gain for various wall orientations. If a south facing wall is not available, then consider either, or both, east and west walls. The east wall would generate the most heat in the morning while the west in the afternoon.

The SOLARWALL® cladding will aid in summer cooling by preventing the normal solar heat gain from striking the main wall. Hot air will thermal syphon up the wall and out the top holes in the solar cladding leaving the main wall cool.

Wall mounting is preferred to roof mount systems due to considerably lower installation costs. A vertical solar panel will actually out-perform a sloped panel during the heating season since sunlight striking the ground in front of a wall will be reflected into the wall panels. A layer of snow can reflect up to 70% additional solar radiation on to the wall, increasing system performance.

APPLICATIONS

The SOLARWALL® heater can be considered for every building which requires ventilation air or makeup air. The SOLARWALL® cladding heats outside air for use in a building.

If the volume of outside air required for ventilation is known at the building design stage, attempt to bring in as much of that air as possible through the SOLARWALL® cladding. If the air volume is not known, maximize the available sun facing wall area and rate the wall as a preheater for outside air flows of between 70 - 140 cubic metres per hour of air per square metre of SOLARWALL® cladding (4 - 8 cfm/ft²).

Ideal applications include:
- industrial buildings
- apartment building corridor ventilation
- commercial buildings with roof fans or penthouses
- hospitals and other institutional buildings
- schools and gymnasiums
- government and military buildings
- warehouses and airport hangars
- residential (new air tight homes)

Indoor air quality is a major issue and is best solved by bringing in as much outside air as possible especially if the fuel to heat it is free sunlight. Designing a wall which is a heater not only addresses the air quality issue but generates income for the owner in terms of fuel savings.

MATERIAL, PROFILES, COLOR

The SOLARWALL® cladding is similar to conventional wall cladding except for the millions of tiny openings, and heat absorbing surface. Fig. 7 shows a few of the various profiles available. Most conventional building profiles can be incorporated into a SOLARWALL® heating system.

Aluminum is used in most SOLARWALL® applications for its superior corrosion resistance properties. The coating on the SOLARWALL® cladding is specially formulated for its solar absorption properties and resistance to ultraviolet degradation. It is a baked-on finish available in several dark colors ranging from black, dark brown, dark green, to dark blue. The darker the color, the greater amount of heat that is absorbed.

ADVANTAGES

- free heating of outside air
- maintenance free
- provides attractive, durable exterior wall
- improves indoor air quality
- effective day and night
- very low capital cost
- 100% environmentally friendly
- virtually eliminates wall heat loss
- summer cooling benefits
- corrects building negative air pressure situations
- recipient of ASHRAE energy award

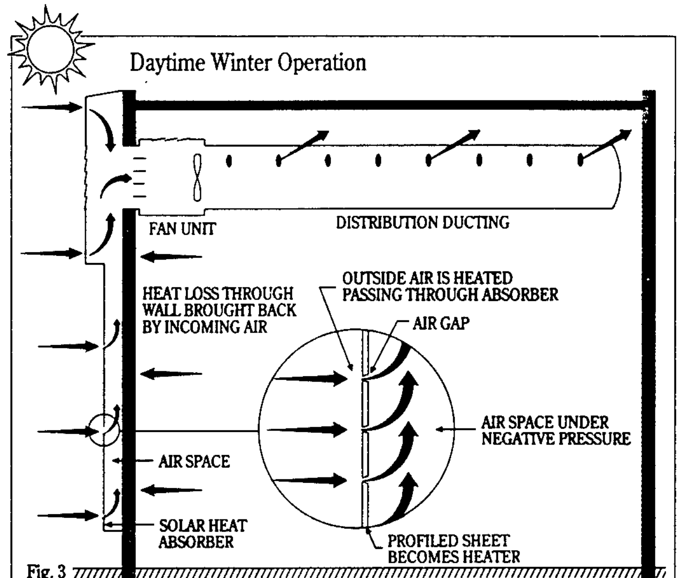


Fig. 3

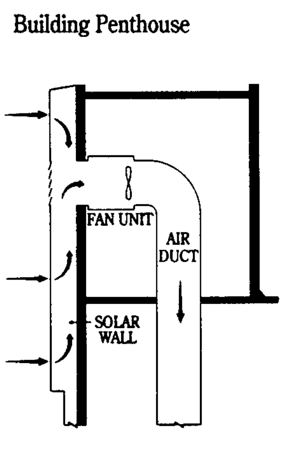


Fig. 4

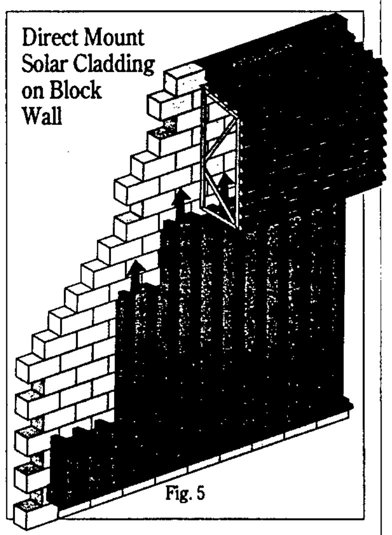


Fig. 5

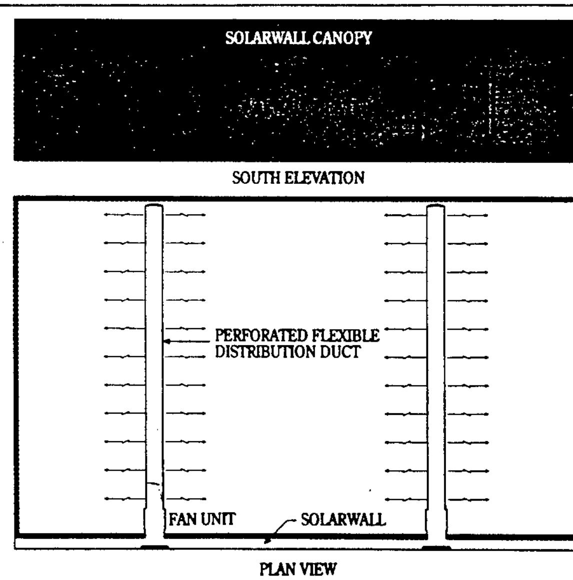
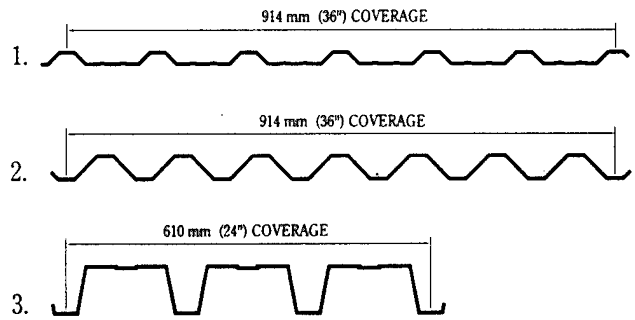


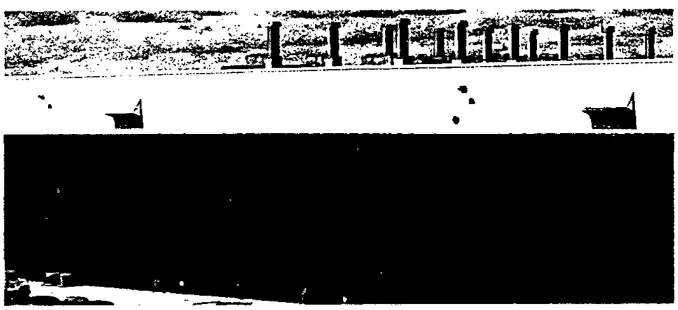
Fig. 6 Typical Industrial Application

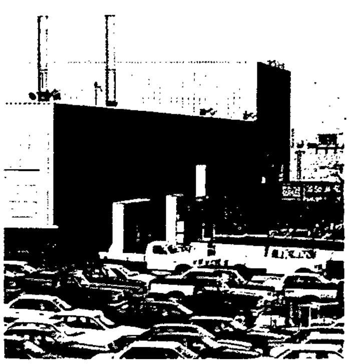
Typical Profiles

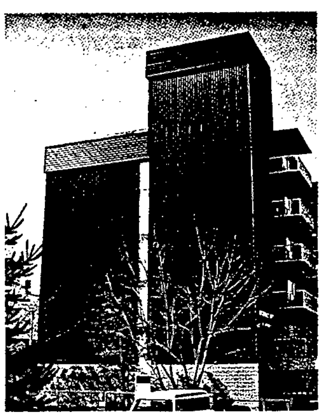


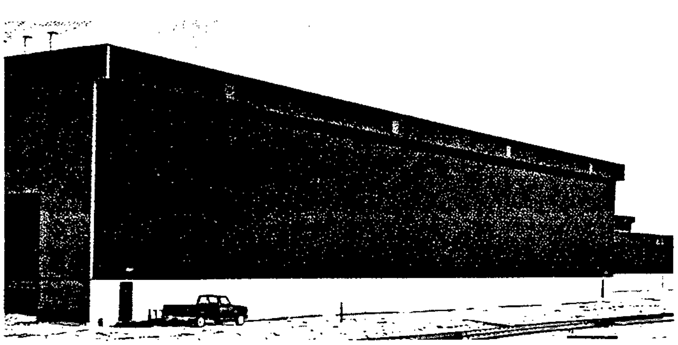
All measurements shown are approximate. Many other profiles are available, contact Conserval.

Fig. 7









SOLARWALL SYSTEMS are protected by patents 1,196,825, 1,283,333, 4,774,932, 4,899,728 and 4,934,338. Other patents pending. SOLARWALL is a registered trademark of Conserval Engineering Inc.

ROSS FOLTZ

FOLTZ ENGINEERING
P.O. BOX 1107
ESTES PARK, CO 80517
(303) 586-8762
FAX 586-3598

Printed in Canada

SUGGESTED SPECIFICATION

Section A SOLARWALL®

WORK INCLUDED: SOLARWALL® system to be designed and supplied by Conserval Engineering Inc. of Downsview, Ontario or Conserval Systems Inc. of Buffalo, NY, including vertical wall cladding and horizontal canopy cladding, flashing and closures, summer bypass damper, and sub-framing to support wall cladding and canopy. Design must develop specified solar heat gain requirements, and provide optimum energy gain and flow to satisfy air intake needs.

HEATING CAPACITY: The SOLARWALL® cladding shall be designed to balance the air flow passing through it and the air shall then be ducted to the nearest intake fan. The air capacity of the total wall shall be _________ m^3/h (_______cfm) or ______$m^3/h/m^2$ (_______cfm/ft^2) of SOLARWALL® area. Supplier shall state the heat capacity of the wall on a sunny day based on test results from a government approved independent laboratory for SOLARWALL® panels at comparable air flow rates.

MATERIALS: Exterior cladding to be nominal 0.80mm (0.032") thick perforated aluminum, standard building sheet alloy, painted solar dark color, in a profile (see fig. 7) to suit solar air flow. The perforated hole size and spacing to be based on solar need and air balancing requirements.

Flashing to be from same aluminum material, unperforated. Supply closures in locations where air infiltration is not desired.

Exposed fasteners to be self-tapping stainless steel sheet metal screws, color to match cladding, per Conserval's standards.

Sub-framing, including support clips, canopy framing, and sub-girts to be manufactured from galvanized steel, minimum nominal thickness of 1.22mm (0.048").

For new installations, provide a flat, unsealed, galvanized sheet, or similar, to isolate insulation from SOLARWALL® air flow.

Summer bypass louvers to have dampers controlled by outdoor thermostat.

DESIGN: SOLARWALL® shall be designed to support positive and negative wind loads noted on the drawings at a deflection not exceeding 1/180th of the span. SOLARWALL® cladding profiles to be based on framing design: eg.

a) 44.5mm (1.75") trapezoidal, to be used with profile running vertically and sub-framing providing required air space.
b) 76mm (3") and 102mm (4") deep rib, to be used with profile running vertically, sub-framing may not be required.

INSTALLATION: Materials to be installed in accordance with the drawings and Conserval's standard installation procedures.

Confirm fastener holding strength prior to installation, especially when fastening to existing building walls.

Section B Conserval Fan

The air make-up unit shall be Conserval model #___, fully assembled, tested and complete with intake and return air modulating dampers and automatic discharge air temperature control, as supplied by Conserval Engineering Inc. of Downsview, Ontario or Conserval Systems Inc. of Buffalo, NY. The unit shall have a capacity of _______ m^3/h (_______cfm) at 187 PA (3/4") static pressure, complete with _______ HP totally enclosed motor and bearings designed for continuous operation, _______ Volts, _______ Phase, _______ Hz.

Warranty

There is a manufacturer's warranty against defects in material and workmanship for a period of one year.

Conserval Engineering Inc.
200 Wildcat Road
Downsview, (Toronto) ON
M3J 2N5
(416) 661-7057 Fax (416) 661-7146

Conserval Systems Inc.
2211 Main Street, Building B
Buffalo, NY 14214
(716) 835-4903 Fax (716) 835-4904

JOHN MEKIS
3/19/93

SOLAR WALL EVALUATION
FORT CARSON
BUILDING 8030
Maintenance Shop

VENTILATION RATE	VENT	274,250	cfm
WALL AREA	AREA	14,160	ft2
COLLECTOR EFFICIENCY	EFF	0%	
AIR HEAT CONTENT	CP	0.83	Btuh/F/cfm
DAYS PER WEEK	DAYS	7	
SYSTEM COST	FIRST	17.88	$/ft2
ENERGY COST	COST	3.48	$/MBTU
HEAT WHEEL EFFECTIVENESS	HWE	71%	
AVERAGE SOLAR TEMP RISE (24 HRS)		0	
ROOM TEMPERATURE	ROOM	64	
BOILER EFFICIENCY	BOIL	70%	

ALL 7 HV UNITS.

COST = $4.97/MILL BTUH

MONTH	DAYS	DAILY SOUTH WALL INSOL Btu/ft2	BASE 65 DEGREE DAYS F-days	AMBIENT TEMP F	SOLAR HEAT MBtu	HEAT WHEEL MBtu	GAS HEAT MBtu	VENT HEATING LOAD MBtu	SOLAR FRACTION
JAN	31	1421	1,116	29	0	4,208	1,888	6,097	0%
FEB	28	1384	952	31	0	3,584	1,617	5,201	0%
MAR	31	1223	930	35	0	3,487	1,594	5,081	0%
APR	30	940	572	46	0	2,095	1,029	3,123	0%
MAY	31	696	302	56	0	962	687	1,649	0%
JUN	30	610	0	65	0	0	0	0	0%
JUL	31	647	0	71	0	0	0	0	0%
AUG	31	831	0	69	0	0	0	0	0%
SEP	30	1170	181	61	0	349	638	987	0%
OCT	31	1438	470	50	0	1,683	886	2,569	0%
NOV	30	1379	810	38	0	3,025	1,400	4,426	0%
DEC	31	1227	1,054	31	0	3,968	1,790	5,758	0%
YR	365	1080.5	6,387		0	23,362	11,529	34,891	0%

ESTIMATED FIRST COST	~~$253,181~~
ANNUAL ENERGY COST SAVINGS	$0
SIMPLE PAYBACK (yrs)	#DIV/0!
ENERGY DISCOUNT FACTOR (1)	9.51
DISCOUNTED ENERGY COST SAVINGS	$0
SIR	0.0
INTERNAL RATE OF RETURN	-100.00%

(1) Natural gas, 4% discount rate, 10 year life, Region 4.

x 4.97 = $173,408
x 4.97 = 57,299
(SAVING) x 4.97 = $\boxed{\$116,109}$

JOB FT CARSON

SHEET NO. OF

E M C ENGINEERS, INC.

Denver • Atlanta • Germany

CALCULATED BY OM DATE 3-18-93

CHECKED BY DATE

SCALE

$$\text{FAN HP} = \frac{\text{CFM} \times (\Delta P \text{ " } H_2O)}{6350 \times 0.50}$$

$$= \frac{274{,}250 \times 1\text{" } \Delta P}{6350 \times 0.50}$$

$= 86.38$ HP $\times$ 745 w/HP $\times$ 3.41 BTUH/w

$$= \frac{219{,}439 \text{ BTUH} \times 8{,}760 \text{ HRS}}{1\text{E}6} / \text{YR}$$

$= 1{,}922$ MBTUH

$\times$ 4.97 \$/MBTUH

$= \boxed{9{,}553 \text{ \$/YR — DIRTY FILTERS}}$

APPENDIX C

LCCA, CALCULATIONS, AND BACKUP DATA, ECOs 13, 14, 16, AND 19

TAB C-1

FORT CARSON MOTOR STUDY
ECO #13

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION: FORT CARSON, COLORADO REGION: 4 PROJECT NO:
PROJECT TITLE: FT CARSON EEAP UPDATE FISCAL YEAR: 1992
DISCRETE PORTION NAME: ECO 13: Replace 12 Standard 1/2 HP Motors with High Efficiency Motors
ANALYSIS DATE: 04/08/93 ECONOMIC LIFE: 20 PREPARED BY: A. NIEMEYER

1 INVESTMENT COSTS

A.	CONSTRUCTION COST	=	$2,770	
B.	SIOH COST	(5.5% of 1A) =	$152	
C.	DESIGN COST	(6.0% of 1A) =	$166	
D.	TOTAL COST	(1A + 1B + 1C) =	$3,089	
E.	SALVAGE VALUE	=	$0	
F.	SALVAGE VALUE OF EXISTING EQUIP.	=	$0	
G.	TOTAL INVESTMENT	(1D - 1E - 1F) =	---------->	$3,089

2 ENERGY SAVINGS (+) or COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS: OCTOBER 1992

	ENERGY SOURCE	COST $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A.	ELEC	$7.32	24.57	$180	14.53	$2,615	
B.	DIST		0	$0	17.63	$0	
C.	NAT GAS	$3.48	0	$0	18.59	$0	
D.	COAL		0	$0	14.46	$0	
E.	SOLAR			$0		$0	
F.	DEMAND SAVINGS	$69.68 / year		$94	13.59	$1,278	
G.	TOTAL		24.57	$274		---------->	$3,893

3 NONENERGY SAVINGS (+) or COST (-)

A. ANNUAL RECURRING $0
1 DISCOUNT FACTOR (From Table A-2) = 13.59
2 DISCOUNTED SAVINGS or COST (3A x 3A1) = $0

B. NONRECURRING

ITEM	SAVINGS or COST (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3)	DISCOUNTED SVGS or COST (4)
a. 12 Standard 1/2 HP Motors	$2,434	5	0.82	$1,996
b.	$0	0	0.00	$0
c.	$0	0	0.00	$0
d TOTAL	$2,434			$1,996

C. TOTAL NONENERGY DISCOUNTED SAVINGS or COST (3A2 + 3Bd4) = $1,996

4 SIMPLE PAYBACK (SPB) - (YRS)	1G/(2G3 + 3A + (3Bd1/20)) =	7.8
5 TOTAL NET DISCOUNTED SAVINGS	(2G5 + 3C) =	$5,889
6 SAVINGS-TO-INVESTMENT RATIO (SIR)	(5/1G) =	1.91
7 ADJUSTED INTERNAL RATE OF RETURN (AIRR) - (%)	[(1+.04) x SIR to 1/20 power - 1] x 100 =	7.41

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION:	FORT CARSON, COLORADO	REGION:	4	PROJECT NO:	
PROJECT TITLE:	FT CARSON EEAP UPDATE			FISCAL YEAR:	1992
DISCRETE PORTION NAME:	ECO 13: Replace 17 Standard 3/4 HP Motors with High Efficiency Motors				
ANALYSIS DATE:	04/08/93	ECONOMIC LIFE: 20		PREPARED BY:	A. NIEMEYER

1 INVESTMENT COSTS

A.	CONSTRUCTION COST	=	$4,140	
B.	SIOH COST	(5.5% of 1A) =	$228	
C.	DESIGN COST	(6.0% of 1A) =	$248	
D.	TOTAL COST	(1A + 1B + 1C) =	$4,616	
E.	SALVAGE VALUE	=	$0	
F.	SALVAGE VALUE OF EXISTING EQUIP.	=	$0	
G.	TOTAL INVESTMENT	(1D - 1E - 1F) =	---------->	$4,616

2 ENERGY SAVINGS (+) or COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS: OCTOBER 1992

	ENERGY SOURCE	COST $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A.	ELEC	$7.32	20.22	$148	14.53	$2,152	
B.	DIST		0	$0	17.63	$0	
C.	NAT GAS	$3.48	0	$0	18.59	$0	
D.	COAL		0	$0	14.46	$0	
E.	SOLAR			$0		$0	
F.	DEMAND SAVINGS	$69.68 / year		$88	13.59	$1,193	
G.	TOTAL		20.22	$236		---------->	$3,345

3 NONENERGY SAVINGS (+) or COST (-)

A. ANNUAL RECURRING			$0	
1 DISCOUNT FACTOR	(From Table A-2) =	13.59		
2 DISCOUNTED SAVINGS or COST	(3A x 3A1) =		$0	

B. NONRECURRING

ITEM	SAVINGS or COST (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3)	DISCOUNTED SVGS or COST (4)
a. 17 Standard 3/4 HP Motors	$3,636	5	0.82	$2,981
b.	$0	0	0.00	$0
c.	$0	0	0.00	$0
d TOTAL	$3,636			$2,981

C. TOTAL NONENERGY DISCOUNTED SAVINGS or COST (3A2 + 3Bd4) = $2,981

4 SIMPLE PAYBACK (SPB) - (YRS)	1G/(2G3 + 3A + (3Bd1/20)) =	11.1
5 TOTAL NET DISCOUNTED SAVINGS	(2G5 + 3C) =	$6,327
6 SAVINGS-TO-INVESTMENT RATIO (SIR)	(5/1G) =	1.37
7 ADJUSTED INTERNAL RATE OF RETURN (AIRR) - (%)	[(1+.04) x SIR to 1/20 power - 1] x 100 =	5.65

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION: FORT CARSON, COLORADO	REGION: 4	PROJECT NO:	
PROJECT TITLE: FT CARSON EEAP UPDATE		FISCAL YEAR:	1992
DISCRETE PORTION NAME: ECO 13: Replace 8 Standard 1 HP Motors with High Efficiency Motors			
ANALYSIS DATE: 04/08/93	ECONOMIC LIFE: 20	PREPARED BY:	A. NIEMEYER

1 INVESTMENT COSTS

A.	CONSTRUCTION COST	=	$3,183	
B.	SIOH COST	(5.5% of 1A) =	$175	
C.	DESIGN COST	(6.0% of 1A) =	$191	
D.	TOTAL COST	(1A + 1B + 1C) =	$3,549	
E.	SALVAGE VALUE	=	$0	
F.	SALVAGE VALUE OF EXISTING EQUIP.	=	$0	
G.	TOTAL INVESTMENT	(1D - 1E - 1F) =	---------->	$3,549

2 ENERGY SAVINGS (+) or COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS: OCTOBER 1992

	ENERGY SOURCE	COST $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A.	ELEC	$7.32	11.20	$82	14.53	$1,192	
B.	DIST		0	$0	17.63	$0	
C.	NAT GAS	$3.48	0	$0	18.59	$0	
D.	COAL		0	$0	14.46	$0	
E.	SOLAR			$0		$0	
F.	DEMAND SAVINGS	$69.68 / year		$45	13.59	$616	
G.	TOTAL		11.20	$127		---------->	$1,808

3 NONENERGY SAVINGS (+) or COST (-)

A. ANNUAL RECURRING			$0	
1 DISCOUNT FACTOR	(From Table A-2) =	13.59		
2 DISCOUNTED SAVINGS or COST	(3A x 3A1) =		$0	

B. NONRECURRING

ITEM	SAVINGS or COST (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3)	DISCOUNTED SVGS or COST (4)
a. 8 Standard 1 HP Motors	$2,464	5	0.82	$2,020
b.	$0	0	0.00	$0
c.	$0	0	0.00	$0
d TOTAL	$2,464			$2,020

C. TOTAL NONENERGY DISCOUNTED SAVINGS or COST (3A2 + 3Bd4) = $2,020

4 SIMPLE PAYBACK (SPB) - (YRS)	1G/(2G3 + 3A + (3Bd1/20)) =	14.2
5 TOTAL NET DISCOUNTED SAVINGS	(2G5 + 3C) =	$3,828
6 SAVINGS-TO-INVESTMENT RATIO (SIR)	(5/1G) =	1.08
7 ADJUSTED INTERNAL RATE OF RETURN (AIRR) - (%)	[(1+.04) x SIR to 1/20 power - 1] x 100 =	4.39

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION: FORT CARSON, COLORADO REGION: 4 PROJECT NO:
PROJECT TITLE: FT CARSON EEAP UPDATE FISCAL YEAR: 1992
DISCRETE PORTION NAME: ECO 13: Replace 13 Standard 1-1/2 HP Motors with High Efficiency Motors
ANALYSIS DATE: 04/08/93 ECONOMIC LIFE: 20 PREPARED BY: A. NIEMEYER

1 INVESTMENT COSTS

A.	CONSTRUCTION COST	=	$5,338	
B.	SIOH COST	(5.5% of 1A) =	$294	
C.	DESIGN COST	(6.0% of 1A) =	$320	
D.	TOTAL COST	(1A + 1B + 1C) =	$5,952	
E.	SALVAGE VALUE	=	$0	
F.	SALVAGE VALUE OF EXISTING EQUIP.	=	$0	
G.	TOTAL INVESTMENT	(1D - 1E - 1F) =	--------->	$5,952

2 ENERGY SAVINGS (+) or COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS: OCTOBER 1992

	ENERGY SOURCE	COST $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A.	ELEC	$7.32	25.54	$187	14.53	$2,718	
B.	DIST		0	$0	17.63	$0	
C.	NAT GAS	$3.48	0	$0	18.59	$0	
D.	COAL		0	$0	14.46	$0	
E.	SOLAR			$0		$0	
F.	DEMAND SAVINGS	$69.68 / year		$105	13.59	$1,420	
G.	TOTAL		25.54	$292		---------->	$4,139

3 NONENERGY SAVINGS (+) or COST (-)

A. ANNUAL RECURRING			$0	
1 DISCOUNT FACTOR	(From Table A-2) =	13.59		
2 DISCOUNTED SAVINGS or COST	(3A x 3A1) =		$0	

B. NONRECURRING

ITEM	SAVINGS or COST (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3)	DISCOUNTED SVGS or COST (4)	
a.	$4,070	5	0.82	$3,337	
b.	$0	0	0.00	$0	
c.	$0	0	0.00	$0	
d TOTAL	$4,070			$3,337	
C. TOTAL NONENERGY DISCOUNTED SAVINGS or COST			(3A2 + 3Bd4) =		$3,337

4 SIMPLE PAYBACK (SPB) - (YRS)	1G/(2G3 + 3A + (3Bd1/20)) =	12.0
5 TOTAL NET DISCOUNTED SAVINGS	(2G5 + 3C) =	$7,476
6 SAVINGS-TO-INVESTMENT RATIO (SIR)	(5/1G) =	1.26
7 ADJUSTED INTERNAL RATE OF RETURN (AIRR) - (%)	[(1+.04) x SIR to 1/20 power - 1] x 100 =	5.19

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION: FORT CARSON, COLORADO REGION: 4 PROJECT NO:
PROJECT TITLE: FT CARSON EEAP UPDATE FISCAL YEAR: 1992
DISCRETE PORTION NAME: ECO 13: Replace 10 Standard 2 HP Motors with High Efficiency Motors
ANALYSIS DATE: 04/08/93 ECONOMIC LIFE: 20 PREPARED BY: A. NIEMEYER

1 INVESTMENT COSTS

A.	CONSTRUCTION COST	=	$4,276	
B.	SIOH COST	(5.5% of 1A) =	$235	
C.	DESIGN COST	(6.0% of 1A) =	$257	
D.	TOTAL COST	(1A + 1B + 1C) =	$4,767	
E.	SALVAGE VALUE	=	$0	
F.	SALVAGE VALUE OF EXISTING EQUIP.	=	$0	
G.	TOTAL INVESTMENT	(1D - 1E - 1F) =	---------->	$4,767

2 ENERGY SAVINGS (+) or COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS: OCTOBER 1992

	ENERGY SOURCE	COST $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A.	ELEC	$7.32	29.99	$220	14.53	$3,192	
B.	DIST		0	$0	17.63	$0	
C.	NAT GAS	$3.48	0	$0	18.59	$0	
D.	COAL		0	$0	14.46	$0	
E.	SOLAR			$0		$0	
F.	DEMAND SAVINGS	$69.68 / year		$91	13.59	$1,241	
G.	TOTAL		29.99	$311		---------->	$4,432

3 NONENERGY SAVINGS (+) or COST (-)

A. ANNUAL RECURRING			$0
1 DISCOUNT FACTOR	(From Table A-2) =	13.59	
2 DISCOUNTED SAVINGS or COST	(3A x 3A1) =		$0

B. NONRECURRING

ITEM	SAVINGS or COST (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3)	DISCOUNTED SVGS or COST (4)
a.	$3,326	5	0.82	$2,727
b.	$0	0	0.00	$0
c.	$0	0	0.00	$0
d TOTAL	$3,326			$2,727

C. TOTAL NONENERGY DISCOUNTED SAVINGS or COST (3A2 + 3Bd4) = $2,727

4 SIMPLE PAYBACK (SPB) - (YRS)	1G/(2G3 + 3A + (3Bd1/20)) =	10.0
5 TOTAL NET DISCOUNTED SAVINGS	(2G5 + 3C) =	$7,160
6 SAVINGS-TO-INVESTMENT RATIO (SIR)	(5/1G) =	1.50
7 ADJUSTED INTERNAL RATE OF RETURN (AIRR) - (%)	[(1+.04) x SIR to 1/20 power - 1] x 100 =	6.14

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION: FORT CARSON, COLORADO   REGION: 4   PROJECT NO:
PROJECT TITLE: FT CARSON EEAP UPDATE   FISCAL YEAR: 1992
DISCRETE PORTION NAME: ECO 13: Replace 10 Standard 3 HP Motors with High Efficiency Motors
ANALYSIS DATE: 04/08/93   ECONOMIC LIFE: 20   PREPARED BY: A. NIEMEYER

1 INVESTMENT COSTS

A.	CONSTRUCTION COST	=	$4,454	
B.	SIOH COST	(5.5% of 1A) =	$245	
C.	DESIGN COST	(6.0% of 1A) =	$267	
D.	TOTAL COST	(1A + 1B + 1C) =	$4,966	
E.	SALVAGE VALUE	=	$0	
F.	SALVAGE VALUE OF EXISTING EQUIP.	=	$0	
G.	TOTAL INVESTMENT	(1D - 1E - 1F) =	---------->	$4,966

2 ENERGY SAVINGS (+) or COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS: OCTOBER 1992

	ENERGY SOURCE	COST $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A.	ELEC	$7.32	43.41	$318	14.53	$4,620	
B.	DIST		0	$0	17.63	$0	
C.	NAT GAS	$3.48	0	$0	18.59	$0	
D.	COAL		0	$0	14.46	$0	
E.	SOLAR			$0		$0	
F.	DEMAND SAVINGS	$69.68 / year		$143	13.59	$1,941	
G.	TOTAL		43.41	$461		---------->	$6,561

3 NONENERGY SAVINGS (+) or COST (-)

A. ANNUAL RECURRING — $0
1 DISCOUNT FACTOR (From Table A-2) = 13.59
2 DISCOUNTED SAVINGS or COST (3A x 3A1) = $0

B. NONRECURRING

ITEM	SAVINGS or COST (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3)	DISCOUNTED SVGS or COST (4)
a. 10 Standard 3 HP Motors	$4,123	5	0.82	$3,381
b.	$0	0	0.00	$0
c.	$0	0	0.00	$0
d TOTAL	$4,123			$3,381

C. TOTAL NONENERGY DISCOUNTED SAVINGS or COST (3A2 + 3Bd4) = $3,381

4 SIMPLE PAYBACK (SPB) - (YRS)	1G/(2G3 + 3A + (3Bd1/20)) =	7.4
5 TOTAL NET DISCOUNTED SAVINGS	(2G5 + 3C) =	$9,942
6 SAVINGS-TO-INVESTMENT RATIO (SIR)	(5/1G) =	2.00
7 ADJUSTED INTERNAL RATE OF RETURN (AIRR) - (%)	[(1+.04) x SIR to 1/20 power - 1] x 100 =	7.67

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION: FORT CARSON, COLORADO   REGION: 4   PROJECT NO:
PROJECT TITLE: FT CARSON EEAP UPDATE   FISCAL YEAR: 1992
DISCRETE PORTION NAME: ECO 13: Replace 29 Standard 5 HP Motors with High Efficiency Motors
ANALYSIS DATE: 04/08/93   ECONOMIC LIFE: 20   PREPARED BY: A. NIEMEYER

1 INVESTMENT COSTS

A.	CONSTRUCTION COST	=	$13,580	
B.	SIOH COST	(5.5% of 1A) =	$747	
C.	DESIGN COST	(6.0% of 1A) =	$815	
D.	TOTAL COST	(1A + 1B + 1C) =	$15,141	
E.	SALVAGE VALUE	=	$0	
F.	SALVAGE VALUE OF EXISTING EQUIP.	=	$0	
G.	TOTAL INVESTMENT	(1D - 1E - 1F) =	---------->	$15,141

2 ENERGY SAVINGS (+) or COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS: OCTOBER 1992

	ENERGY SOURCE	COST $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A.	ELEC	$7.32	215.64	$1,580	14.53	$22,951	
B.	DIST		0	$0	17.63	$0	
C.	NAT GAS	$3.48	0	$0	18.59	$0	
D.	COAL		0	$0	14.46	$0	
E.	SOLAR			$0		$0	
F.	DEMAND SAVINGS	$69.68 / year		$611	13.59	$8,305	
G.	TOTAL		215.64	$2,191		---------->	$31,256

3 NONENERGY SAVINGS (+) or COST (-)

A.	ANNUAL RECURRING			$0
	1 DISCOUNT FACTOR	(From Table A-2) =	13.59	
	2 DISCOUNTED SAVINGS or COST	(3A x 3A1) =		$0

B. NONRECURRING

ITEM	SAVINGS or COST (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3)	DISCOUNTED SVGS or COST (4)	
a. 29 Standard 5 HP Motors	$12,522	5	0.82	$10,268	
b.	$0	0	0.00	$0	
c.	$0	0	0.00	$0	
d TOTAL	$12,522			$10,268	
C. TOTAL NONENERGY DISCOUNTED SAVINGS or COST			(3A2 + 3Bd4) =		$10,268

4 SIMPLE PAYBACK (SPB) - (YRS)	1G/(2G3 + 3A + (3Bd1/20)) =	5.4
5 TOTAL NET DISCOUNTED SAVINGS	(2G5 + 3C) =	$41,524
6 SAVINGS-TO-INVESTMENT RATIO (SIR)	(5/1G) =	2.74
7 ADJUSTED INTERNAL RATE OF RETURN (AIRR) - (%)	[(1+.04) x SIR to 1/20 power - 1] x 100 =	9.38

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION: FORT CARSON, COLORADO   REGION: 4   PROJECT NO:
PROJECT TITLE: FT CARSON EEAP UPDATE   FISCAL YEAR: 1992
DISCRETE PORTION NAME: ECO 13: Replace 13 Standard 7-1/2 HP Motors with High Efficiency Motors
ANALYSIS DATE: 04/08/93   ECONOMIC LIFE: 20   PREPARED BY: A. NIEMEYER

1 INVESTMENT COSTS

A. CONSTRUCTION COST	=	$8,147		
B. SIOH COST	(5.5% of 1A) =	$448		
C. DESIGN COST	(6.0% of 1A) =	$489		
D. TOTAL COST	(1A + 1B + 1C) =	$9,083		
E. SALVAGE VALUE	=	$0		
F. SALVAGE VALUE OF EXISTING EQUIP.	=	$0		
G. TOTAL INVESTMENT	(1D - 1E - 1F) =	---------->		$9,083

2 ENERGY SAVINGS (+) or COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS: OCTOBER 1992

ENERGY SOURCE	COST \$/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL \$ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A. ELEC	$7.32	107.68	$789	14.53	$11,461	
B. DIST		0	$0	17.63	$0	
C. NAT GAS	$3.48	0	$0	18.59	$0	
D. COAL		0	$0	14.46	$0	
E. SOLAR			$0		$0	
F. DEMAND SAVINGS	$69.68 / year		$339	13.59	$4,612	
G. TOTAL		107.68	$1,128		---------->	$16,072

3 NONENERGY SAVINGS (+) or COST (-)

A. ANNUAL RECURRING $0

1 DISCOUNT FACTOR (From Table A-2) = 13.59

2 DISCOUNTED SAVINGS or COST (3A x 3A1) = $0

B. NONRECURRING

ITEM	SAVINGS or COST (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3)	DISCOUNTED SVGS or COST (4)
a. 13 Standard 7-1/2 HP Motors	$7,265	5	0.82	$5,957
b.	$0	0	0.00	$0
c.	$0	0	0.00	$0
d TOTAL	$7,265			$5,957

C. TOTAL NONENERGY DISCOUNTED SAVINGS or COST (3A2 + 3Bd4) = $5,957

4 SIMPLE PAYBACK (SPB) - (YRS)	1G/(2G3 + 3A + (3Bd1/20)) =	6.1
5 TOTAL NET DISCOUNTED SAVINGS	(2G5 + 3C) =	$22,029
6 SAVINGS-TO-INVESTMENT RATIO (SIR)	(5/1G) =	2.43
7 ADJUSTED INTERNAL RATE OF RETURN (AIRR) - (%)	[(1+.04) x SIR to 1/20 power - 1] x 100 =	8.71

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION: FORT CARSON, COLORADO REGION: 4 PROJECT NO:
PROJECT TITLE: FT CARSON EEAP UPDATE FISCAL YEAR: 1992
DISCRETE PORTION NAME: ECO 13: Replace 13 Standard 10 HP Motors with High Efficiency Motors
ANALYSIS DATE: 04/08/93 ECONOMIC LIFE: 20 PREPARED BY: A. NIEMEYER

1 INVESTMENT COSTS

A. CONSTRUCTION COST	=	$9,078	
B. SIOH COST	(5.5% of 1A) =	$499	
C. DESIGN COST	(6.0% of 1A) =	$545	
D. TOTAL COST	(1A + 1B + 1C) =	$10,122	
E. SALVAGE VALUE	=	$0	
F. SALVAGE VALUE OF EXISTING EQUIP.	=	$0	
G. TOTAL INVESTMENT	(1D - 1E - 1F) =	---------->	$10,122

2 ENERGY SAVINGS (+) or COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS: OCTOBER 1992

ENERGY SOURCE	COST $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A. ELEC	$7.32	99.66	$730	14.53	$10,607	
B. DIST		0	$0	17.63	$0	
C. NAT GAS	$3.48	0	$0	18.59	$0	
D. COAL		0	$0	14.46	$0	
E. SOLAR			$0		$0	
F. DEMAND SAVINGS	$69.68 / year		$367	13.59	$4,981	
G. TOTAL		99.66	$1,097		---------->	$15,588

3 NONENERGY SAVINGS (+) or COST (-)

A. ANNUAL RECURRING			$0	
1 DISCOUNT FACTOR	(From Table A-2) =	13.59		
2 DISCOUNTED SAVINGS or COST	(3A x 3A1) =		$0	

B. NONRECURRING

ITEM	SAVINGS or COST (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3)	DISCOUNTED SVGS or COST (4)	
a. 13 Standard 10 HP Motors	$7,799	5	0.82	$6,395	
b.	$0	0	0.00	$0	
c.	$0	0	0.00	$0	
d TOTAL	$7,799			$6,395	
C. TOTAL NONENERGY DISCOUNTED SAVINGS or COST			(3A2 + 3Bd4) =		$6,395

4 SIMPLE PAYBACK (SPB) - (YRS)	1G/(2G3 + 3A + (3Bd1/20)) =	6.8
5 TOTAL NET DISCOUNTED SAVINGS	(2G5 + 3C) =	$21,983
6 SAVINGS-TO-INVESTMENT RATIO (SIR)	(5/1G) =	2.17
7 ADJUSTED INTERNAL RATE OF RETURN (AIRR) - (%)	[(1+.04) x SIR to 1/20 power - 1] x 100 =	8.11

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION: FORT CARSON, COLORADO REGION: 4 PROJECT NO:
PROJECT TITLE: FT CARSON EEAP UPDATE FISCAL YEAR: 1992
DISCRETE PORTION NAME: ECO 13: Replace 2 Standard 15 HP Motors with High Efficiency Motors
ANALYSIS DATE: 04/08/93 ECONOMIC LIFE: 20 PREPARED BY: A. NIEMEYER

1 INVESTMENT COSTS

A.	CONSTRUCTION COST	=	$1,958	
B.	SIOH COST	(5.5% of 1A) =	$108	
C.	DESIGN COST	(6.0% of 1A) =	$118	
D.	TOTAL COST	(1A + 1B + 1C) =	$2,184	
E.	SALVAGE VALUE	=	$0	
F.	SALVAGE VALUE OF EXISTING EQUIP.	=	$0	
G.	TOTAL INVESTMENT	(1D - 1E - 1F) =	--------->	$2,184

2 ENERGY SAVINGS (+) or COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS: OCTOBER 1992

	ENERGY SOURCE	COST $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A.	ELEC	$7.32	26.78	$196	14.53	$2,850	
B.	DIST		0	$0	17.63	$0	
C.	NAT GAS	$3.48	0	$0	18.59	$0	
D.	COAL		0	$0	14.46	$0	
E.	SOLAR			$0		$0	
F.	DEMAND SAVINGS	$69.68 / year		$83	13.59	$1,127	
G.	TOTAL		26.78	$279		--------->	$3,977

3 NONENERGY SAVINGS (+) or COST (-)

A.	ANNUAL RECURRING			$0
	1 DISCOUNT FACTOR	(From Table A-2) =	13.59	
	2 DISCOUNTED SAVINGS or COST	(3A x 3A1) =		$0

B. NONRECURRING

ITEM	SAVINGS or COST (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3)	DISCOUNTED SVGS or COST (4)
a. 2 Standard 15 HP Motors	$1,614	5	0.82	$1,324
b.	$0	0	0.00	$0
c.	$0	0	0.00	$0
d TOTAL	$1,614			$1,324

C. TOTAL NONENERGY DISCOUNTED SAVINGS or COST (3A2 + 3Bd4) = $1,324

4 SIMPLE PAYBACK (SPB) - (YRS)	1G/(2G3 + 3A + (3Bd1/20)) =	6.1
5 TOTAL NET DISCOUNTED SAVINGS	(2G5 + 3C) =	$5,301
6 SAVINGS-TO-INVESTMENT RATIO (SIR)	(5/1G) =	2.43
7 ADJUSTED INTERNAL RATE OF RETURN (AIRR) - (%)	[(1+.04) x SIR to 1/20 power - 1] x 100 =	8.72

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION: FORT CARSON, COLORADO REGION: 4 PROJECT NO:
PROJECT TITLE: FT CARSON EEAP UPDATE FISCAL YEAR: 1992
DISCRETE PORTION NAME: ECO 13: Replace 2 Standard 20 HP Motors with High Efficiency Motors
ANALYSIS DATE: 04/08/93 ECONOMIC LIFE: 20 PREPARED BY: A. NIEMEYER

1 INVESTMENT COSTS

A.	CONSTRUCTION COST	=	$2,369	
B.	SIOH COST	(5.5% of 1A) =	$130	
C.	DESIGN COST	(6.0% of 1A) =	$142	
D.	TOTAL COST	(1A + 1B + 1C) =	$2,642	
E.	SALVAGE VALUE	=	$0	
F.	SALVAGE VALUE OF EXISTING EQUIP.	=	$0	
G.	TOTAL INVESTMENT	(1D - 1E - 1F) =	---------->	$2,642

2 ENERGY SAVINGS (+) or COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS: OCTOBER 1992

	ENERGY SOURCE	COST $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A.	ELEC	$7.32	17.25	$126	14.53	$1,836	
B.	DIST		0	$0	17.63	$0	
C.	NAT GAS	$3.48	0	$0	18.59	$0	
D.	COAL		0	$0	14.46	$0	
E.	SOLAR			$0		$0	
F.	DEMAND SAVINGS	$69.68 / year		$85	13.59	$1,155	
G.	TOTAL		17.25	$211		---------->	$2,991

3 NONENERGY SAVINGS (+) or COST (-)

A.	ANNUAL RECURRING			$0
	1 DISCOUNT FACTOR	(From Table A-2) =	13.59	
	2 DISCOUNTED SAVINGS or COST	(3A x 3A1) =		$0

B. NONRECURRING

ITEM	SAVINGS or COST (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3)	DISCOUNTED SVGS or COST (4)
a. 2 Standard 20 HP Motors	$1,986	5	0.82	$1,628
b.	$0	0	0.00	$0
c.	$0	0	0.00	$0
d TOTAL	$1,986			$1,628

C. TOTAL NONENERGY DISCOUNTED SAVINGS or COST (3A2 + 3Bd4) = $1,628

4 SIMPLE PAYBACK (SPB) - (YRS)	1G/(2G3 + 3A + (3Bd1/20)) =	8.5
5 TOTAL NET DISCOUNTED SAVINGS	(2G5 + 3C) =	$4,620
6 SAVINGS-TO-INVESTMENT RATIO (SIR)	(5/1G) =	1.75
7 ADJUSTED INTERNAL RATE OF RETURN (AIRR) - (%)	[(1+.04) x SIR to 1/20 power - 1] x 100 =	6.95

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION: FORT CARSON, COLORADO   REGION: 4   PROJECT NO:
PROJECT TITLE: FT CARSON EEAP UPDATE   FISCAL YEAR: 1992
DISCRETE PORTION NAME: ECO 13: Replace 4 Standard 25 HP Motors with High Efficiency Motors
ANALYSIS DATE: 04/08/93   ECONOMIC LIFE: 20   PREPARED BY: A. NIEMEYER

1 INVESTMENT COSTS

A.	CONSTRUCTION COST	=	$6,083	
B.	SIOH COST	(5.5% of 1A) =	$335	
C.	DESIGN COST	(6.0% of 1A) =	$365	
D.	TOTAL COST	(1A + 1B + 1C) =	$6,783	
E.	SALVAGE VALUE	=	$0	
F.	SALVAGE VALUE OF EXISTING EQUIP.	=	$0	
G.	TOTAL INVESTMENT	(1D - 1E - 1F) =	---------->	$6,783

2 ENERGY SAVINGS (+) or COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS: OCTOBER 1992

	ENERGY SOURCE	COST $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A.	ELEC	$7.32	61.54	$451	14.53	$6,550	
B.	DIST		0	$0	17.63	$0	
C.	NAT GAS	$3.48	0	$0	18.59	$0	
D.	COAL		0	$0	14.46	$0	
E.	SOLAR			$0		$0	
F.	DEMAND SAVINGS	$69.68 / year		$191	13.59	$2,595	
G.	TOTAL		61.54	$642		---------->	$9,144

3 NONENERGY SAVINGS (+) or COST (-)

A. ANNUAL RECURRING			$0	
1 DISCOUNT FACTOR	(From Table A-2) =	13.59		
2 DISCOUNTED SAVINGS or COST	(3A x 3A1) =		$0	

B. NONRECURRING

ITEM	SAVINGS or COST (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3)	DISCOUNTED SVGS or COST (4)
a. 4 Standard 25 HP Motors	$4,818	5	0.82	$3,951
b.	$0	0	0.00	$0
c.	$0	0	0.00	$0
d TOTAL	$4,818			$3,951

C. TOTAL NONENERGY DISCOUNTED SAVINGS or COST (3A2 + 3Bd4) = $3,951

4 SIMPLE PAYBACK (SPB) - (YRS)	1G/(2G3 + 3A + (3Bd1/20)) =	7.7
5 TOTAL NET DISCOUNTED SAVINGS	(2G5 + 3C) =	$13,095
6 SAVINGS-TO-INVESTMENT RATIO (SIR)	(5/1G) =	1.93
7 ADJUSTED INTERNAL RATE OF RETURN (AIRR) - (%)	[(1+.04) x SIR to 1/20 power - 1] x 100 =	7.48

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION: FORT CARSON, COLORADO   REGION: 4   PROJECT NO:
PROJECT TITLE: FT CARSON EEAP UPDATE   FISCAL YEAR: 1992
DISCRETE PORTION NAME: ECO 13: Replace 2 Standard 30 HP Motors with High Efficiency Motors
ANALYSIS DATE: 04/08/93   ECONOMIC LIFE: 20   PREPARED BY: A. NIEMEYER

1 INVESTMENT COSTS

A. CONSTRUCTION COST	=	$3,577	
B. SIOH COST	(5.5% of 1A) =	$197	
C. DESIGN COST	(6.0% of 1A) =	$215	
D. TOTAL COST	(1A + 1B + 1C) =	$3,989	
E. SALVAGE VALUE	=	$0	
F. SALVAGE VALUE OF EXISTING EQUIP.	=	$0	
G. TOTAL INVESTMENT	(1D - 1E - 1F) =	--------->	$3,989

2 ENERGY SAVINGS (+) or COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS: OCTOBER 1992

ENERGY SOURCE	COST $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A. ELEC	$7.32	32.03	$235	14.53	$3,409	
B. DIST		0	$0	17.63	$0	
C. NAT GAS	$3.48	0	$0	18.59	$0	
D. COAL		0	$0	14.46	$0	
E. SOLAR			$0		$0	
F. DEMAND SAVINGS	$69.68 / year		$100	13.59	$1,354	
G. TOTAL		32.03	$334		--------->	$4,763

3 NONENERGY SAVINGS (+) or COST (-)

A. ANNUAL RECURRING			$0	
1 DISCOUNT FACTOR	(From Table A-2) =	13.59		
2 DISCOUNTED SAVINGS or COST	(3A x 3A1) =		$0	

B. NONRECURRING

ITEM	SAVINGS or COST (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3)	DISCOUNTED SVGS or COST (4)	
a.	$2,812	5	0.82	$2,306	
b.	$0	0	0.00	$0	
c.	$0	0	0.00	$0	
d TOTAL	$2,812			$2,306	
C. TOTAL NONENERGY DISCOUNTED SAVINGS or COST			(3A2 + 3Bd4) =		$2,306

4 SIMPLE PAYBACK (SPB) - (YRS)	1G/(2G3 + 3A + (3Bd1/20)) =	8.4
5 TOTAL NET DISCOUNTED SAVINGS	(2G5 + 3C) =	$7,069
6 SAVINGS-TO-INVESTMENT RATIO (SIR)	(5/1G) =	1.77
7 ADJUSTED INTERNAL RATE OF RETURN (AIRR) - (%)	[(1+.04) x SIR to 1/20 power - 1] x 100 =	7.02

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION: FORT CARSON, COLORADO   REGION: 4   PROJECT NO:
PROJECT TITLE: FT CARSON EEAP UPDATE   FISCAL YEAR: 1992
DISCRETE PORTION NAME: ECO 13: Replace 6 Standard 40 HP Motors with High Efficiency Motors
ANALYSIS DATE: 04/08/93   ECONOMIC LIFE: 20   PREPARED BY: A. NIEMEYER

1 INVESTMENT COSTS

A.	CONSTRUCTION COST	=	$13,934	
B.	SIOH COST	(5.5% of 1A) =	$766	
C.	DESIGN COST	(6.0% of 1A) =	$836	
D.	TOTAL COST	(1A + 1B + 1C) =	$15,536	
E.	SALVAGE VALUE	=	$0	
F.	SALVAGE VALUE OF EXISTING EQUIP.	=	$0	
G.	TOTAL INVESTMENT	(1D - 1E - 1F) =	---------->	$15,536

2 ENERGY SAVINGS (+) or COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS: OCTOBER 1992

	ENERGY SOURCE	COST $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A.	ELEC	$7.32	130.40	$955	14.53	$13,879	
B.	DIST		0	$0	17.63	$0	
C.	NAT GAS	$3.48	0	$0	18.59	$0	
D.	COAL		0	$0	14.46	$0	
E.	SOLAR			$0		$0	
F.	DEMAND SAVINGS	$69.68 / year		$406	13.59	$5,511	
G.	TOTAL		130.40	$1,361		---------->	$19,390

3 NONENERGY SAVINGS (+) or COST (-)

A.	ANNUAL RECURRING			$0
	1 DISCOUNT FACTOR	(From Table A-2) =	13.59	
	2 DISCOUNTED SAVINGS or COST	(3A x 3A1) =		$0

B. NONRECURRING

ITEM	SAVINGS or COST (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3)	DISCOUNTED SVGS or COST (4)
a. 6 Standard 40 HP Motors	$11,095	5	0.82	$9,098
b.	$0	0	0.00	$0
c.	$0	0	0.00	$0
d TOTAL	$11,095			$9,098

C. TOTAL NONENERGY DISCOUNTED SAVINGS or COST (3A2 + 3Bd4) = $9,098

4 SIMPLE PAYBACK (SPB) - (YRS)	1G/(2G3 + 3A + (3Bd1/20)) =	8.1
5 TOTAL NET DISCOUNTED SAVINGS	(2G5 + 3C) =	$28,488
6 SAVINGS-TO-INVESTMENT RATIO (SIR)	(5/1G) =	1.83
7 ADJUSTED INTERNAL RATE OF RETURN (AIRR) - (%)	[(1+.04) x SIR to 1/20 power - 1] x 100 =	7.20

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION: FORT CARSON, COLORADO   REGION: 4   PROJECT NO:
PROJECT TITLE: FT CARSON EEAP UPDATE   FISCAL YEAR: 1992
DISCRETE PORTION NAME: ECO 13: Replace 141 Standard Motors (1/2 to 40 HP) with High Efficiency Motors
ANALYSIS DATE: 04/08/93   ECONOMIC LIFE: 20   PREPARED BY: A. NIEMEYER

1 INVESTMENT COSTS

A.	CONSTRUCTION COST	=	$82,886	
B.	SIOH COST	(5.5% of 1A) =	$4,559	
C.	DESIGN COST	(6.0% of 1A) =	$4,973	
D.	TOTAL COST	(1A + 1B + 1C) =	$92,418	
E.	SALVAGE VALUE	=	$0	
F.	SALVAGE VALUE OF EXISTING EQUIP.	=	$0	
G.	TOTAL INVESTMENT	(1D - 1E - 1F) =	---------->	$92,418

2 ENERGY SAVINGS (+) or COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS: OCTOBER 1992

	ENERGY SOURCE	COST $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A.	ELEC	$7.32	845.91	$6,196	14.53	$90,031	
B.	DIST		0	$0	17.63	$0	
C.	NAT GAS	$3.48	0	$0	18.59	$0	
D.	COAL		0	$0	14.46	$0	
E.	SOLAR			$0		$0	
F.	DEMAND SAVINGS	$69.68 / year	(39.4 kW)	$2,747	13.59	$37,338	
G.	TOTAL		845.91	$8,944		---------->	$127,370

3 NONENERGY SAVINGS (+) or COST (-)

A. ANNUAL RECURRING			$0	
1 DISCOUNT FACTOR	(From Table A-2) =	13.59		
2 DISCOUNTED SAVINGS or COST	(3A x 3A1) =		$0	

B. NONRECURRING

ITEM	SAVINGS or COST (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3)	DISCOUNTED SVGS or COST (4)
a. 141 Standard Motors (1/2 to 40 HP)	$69,964	5	0.82	$57,370
b.	$0	0	0.00	$0
c.	$0	0	0.00	$0
d TOTAL	$69,964			$57,370

C. TOTAL NONENERGY DISCOUNTED SAVINGS or COST (3A2 + 3Bd4) = $57,370

4 SIMPLE PAYBACK (SPB) - (YRS)	1G/(2G3 + 3A + (3Bd1/20)) =	7.4
5 TOTAL NET DISCOUNTED SAVINGS	(2G5 + 3C) =	$184,740
6 SAVINGS-TO-INVESTMENT RATIO (SIR)	(5/1G) =	2.00
7 ADJUSTED INTERNAL RATE OF RETURN (AIRR) - (%)	[(1+.04) x SIR to 1/20 power - 1] x 100 =	7.66

CONSTRUCTION COST ESTIMATE	DATE PREPARED 06-Apr-93	SHEET 1 OF 3

Project
UPDATE EXISTING EEAP

Location
FORT CARSON, COLORADO

Architect-Engineer
E M C ENGINEERS, INC., 2750 S. WADSWORTH BLVD., DENVER, CO 80227

BASIS FOR ESTIMATE
X Code A (No design completed)
_ Code B (Preliminary design)
_ Code C (Final design)
_ Other (Specify)_____

Drawing No.

Estimator
A. NIEMEYER

Checked by
T. FORSTER

ECO #13 High Efficiency Motors (Remove existing motor, install new)	Quantity		Labor		Material		Total Cost
	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	
0.5 HP Motor	12	EA	41.91	502.92	118.80	1425.60	$1,928.52
Overhead, Bond, Ins. (16.8%)							$323.99
Workers Comp. Ins. (7.3%)							$36.71
Profit (10%)							$228.92
Contingency (10%)							$251.82
TOTAL							**$2,769.97**
0.75 HP Motor	17	EA	41.91	712.47	127.80	2172.60	$2,885.07
Overhead, Bond, Ins. (16.8%)							$484.69
Workers Comp. Ins. (7.3%)							$52.01
Profit (10%)							$342.18
Contingency (10%)							$376.40
TOTAL							**$4,140.35**
1 HP Motor	8	EA	41.91	335.28	237.00	1896.00	$2,231.28
Overhead, Bond, Ins. (16.8%)							$374.86
Workers Comp. Ins. (7.3%)							$24[illegible]
Profit (10%)							$26[illegible]
Contingency (10%)							$289.37
TOTAL							**$3,183.04**
1.5 HP Motor	13	EA	41.91	544.83	246.00	3198.00	$3,742.83
Overhead, Bond, Ins. (16.8%)							$628.80
Workers Comp. Ins. (7.3%)							$39.77
Profit (10%)							$441.14
Contingency (10%)							$485.25
TOTAL							**$5,337.80**
2 HP Motor	10	EA	41.91	419.10	258.00	2580.00	$2,999.10
Overhead, Bond, Ins. (16.8%)							$503.85
Workers Comp. Ins. (7.3%)							$30.59
Profit (10%)							$353.35
Contingency (10%)							$388.69
TOTAL							**$4,275.59**
3 HP Motor	10	EA	41.91	419.10	270.60	2706.00	$3,125.10
Overhead, Bond, Ins. (16.8%)							$525.02
Workers Comp. Ins. (7.3%)							$30.59
Profit (10%)							$368.07
Contingency (10%)							$404.88
TOTAL							**$4,45[illegible]**

ENG FORM 150
1 AUG 59

PREVIOUS EDITION MAY BE USED

*U.S. GOVERNMENT PRINTING OFFICE 1959 0-516148

CONSTRUCTION COST ESTIMATE	DATE PREPARED 06-Apr-93	SHEET 2 OF 3
Project: UPDATE EXISTING EEAP	BASIS FOR ESTIMATE	
Location: FORT CARSON, COLORADO	X Code A (No design completed)	
Architect-Engineer: E M C ENGINEERS, INC., 2750 S. WADSWORTH BLVD., DENVER, CO 80227	_ Code B (Preliminary design) _ Code C (Final design) _ Other (Specify)	
Drawing No.	Estimator: A. NIEMEYER	Checked by: T. FORSTER

ECO #13 High Efficiency Motors (Remove existing motor, install new)	Quantity		Labor		Material		Total Cost
	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	
5 HP Motor	29	EA	41.91	1215.40	286.80	8317.20	$9,532.60
Overhead, Bond, Ins. (16.8%)							$1,601.48
Workers Comp. Ins. (7.3%)							$88.72
Profit (10%)							$1,122.28
Contingency (10%)							$1,234.51
TOTAL							**$13,579.58**
7.5 HP Motor	13	EA	49.70	646.12	390.60	5077.80	$5,723.92
Overhead, Bond, Ins. (16.8%)							$961.62
Workers Comp. Ins. (7.3%)							$47.17
Profit (10%)							$673.27
Contingency (10%)							$740.60
TOTAL							**$8,146.57**
10 HP Motor	13	EA	51.66	671.64	439.20	5709.60	$6,381.24
Overhead, Bond, Ins. (16.8%)							$1,072.05
Workers Comp. Ins. (7.3%)							$49.03
Profit (10%)							$750.23
Contingency (10%)							$825.25
TOTAL							**$9,077.80**
15 HP Motor	2	EA	62.00	123.99	627.00	1254.00	$1,377.99
Overhead, Bond, Ins. (16.8%)							$231.50
Workers Comp. Ins. (7.3%)							$9.05
Profit (10%)							$161.85
Contingency (10%)							$178.04
TOTAL							**$1,958.44**
20 HP Motor	2	EA	73.92	147.84	759.60	1519.20	$1,667.04
Overhead, Bond, Ins. (16.8%)							$280.06
Workers Comp. Ins. (7.3%)							$10.79
Profit (10%)							$195.79
Contingency (10%)							$215.37
TOTAL							**$2,369.06**
25 HP Motor	4	EA	76.46	305.85	994.80	3979.20	$4,285.05
Overhead, Bond, Ins. (16.8%)							$719.89
Workers Comp. Ins. (7.3%)							$22.33
Profit (10%)							$502.73
Contingency (10%)							$553.00
TOTAL							**$6,083.00**

ENG FORM 150
1 AUG 59

PREVIOUS EDITION MAY BE USED

*U.S. GOVERNMENT PRINTING OFFICE 1959 0-516148

CONSTRUCTION COST ESTIMATE	DATE PREPARED 06-Apr-93	SHEET 3 OF 3

Project: UPDATE EXISTING EEAP	BASIS FOR ESTIMATE
Location: FORT CARSON, COLORADO	X Code A (No design completed)
Architect-Engineer: E M C ENGINEERS, INC., 2750 S. WADSWORTH BLVD., DENVER, CO 80227	__ Code B (Preliminary design) __ Code C (Final design) __ Other (Specify)
Drawing No. / Estimator: A. NIEMEYER	Checked by: T. FORSTER

ECO #13 High Efficiency Motors (Remove existing motor, install new)	Quantity No. Units	Quantity Unit Meas.	Labor Per Unit	Labor Total	Material Per Unit	Material Total	Total Cost
30 HP Motor	2	EA	79.21	158.42	1181.40	2362.80	$2,521.22
Overhead, Bond, Ins. (16.8%)							$423.57
Workers Comp. Ins. (7.3%)							$11.56
Profit (10%)							$295.64
Contingency (10%)							$325.20
TOTAL							$3,577.19
40 HP Motor	6	EA	93.00	557.98	1544.40	9266.40	$9,824.38
Overhead, Bond, Ins. (16.8%)							$1,650.50
Workers Comp. Ins. (7.3%)							$40.73
Profit (10%)							$1,151.56
Contingency (10%)							$1,266.72
TOTAL							$13,933.88
GRAND TOTAL							$82,885.93

ENG FORM 150
1 AUG 59

PREVIOUS EDITION MAY BE USED

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LINE NO.	BLDG NO.	MOTOR APPLICATION	MOTOR SIZE (HP)	PART. LOAD FACTOR (0.00)	MOTOR EFFICIENCY EXISTING	NEW	HOURS OF OPERATION (HRS/YR)	ELECTRICAL DEMAND REDUCTION (kW)	ANNUAL ELECTRICAL ENERGY SAVINGS (kWh/YR)	(MBTU)
	P-8142	MAU-7	0.5	0.75	0.600	0.790	6570	0.11	737	2.51
	P-8000	PRV8-1	0.5	0.75	0.600	0.790	4130	0.11	463	1.58
	P-8000	PRV1-5	0.5	0.75	0.600	0.790	4130	0.11	463	1.58
	P-8000	EF2-3	0.5	0.75	0.600	0.790	4130	0.11	463	1.58
	P-8142	MAU-8	0.5	0.75	0.600	0.790	6570	0.11	737	2.51
	P-8142	MAU-5	0.5	0.75	0.600	0.790	6570	0.11	737	2.51
	P-8000	PRV7-3	0.5	0.75	0.600	0.790	4130	0.11	463	1.58
	P-8142	MAU-3	0.5	0.75	0.600	0.790	6570	0.11	737	2.51
	P-8142	MAU-4	0.5	0.75	0.600	0.790	6570	0.11	737	2.51
	P-8000	PRV7-4	0.5	0.75	0.600	0.790	4130	0.11	463	1.58
	P-8000	PRV6-3	0.5	0.75	0.600	0.790	4130	0.11	463	1.58
	P-8030	EF-1	0.5	0.75	0.600	0.790	6570	0.11	737	2.51
								1.35	**7199.14**	**24.57**
	P-8142	UH-1C	0.75	0.75	0.720	0.825	6570	0.07	487	1.66
	P-2352	Hot Water Pump	0.75	0.75	0.720	0.825	6577	0.07	488	1.67
	P-8142	UH-1B	0.75	0.75	0.720	0.825	6570	0.07	487	1.66
	P-8000	PRV9-1	0.75	0.75	0.720	0.825	4130	0.07	306	1.05
	P-8142	UH-1A	0.75	0.75	0.720	0.825	6570	0.07	487	1.66
	P-8142	UH-1E	0.75	0.75	0.720	0.825	6570	0.07	487	1.66
	P-8142	UH-1D	0.75	0.75	0.720	0.825	6570	0.07	487	1.66
	P-8000	PRV4-2	0.75	0.75	0.720	0.825	4130	0.07	306	1.05
	P-8000	EF1-3	0.75	0.75	0.720	0.825	4130	0.07	306	1.05
	P-8000	AC 9-1	0.75	0.75	0.720	0.825	1640	0.07	122	0.42
	P-8000	PRV6-2	0.75	0.75	0.720	0.825	4130	0.07	306	1.05
	P-8000	PRV4-1	0.75	0.75	0.720	0.825	4130	0.07	306	1.05
	P-8000	EF1-2	0.75	0.75	0.720	0.825	4130	0.07	306	1.05
	P-8000	PRV4-3	0.75	0.75	0.720	0.825	4130	0.07	306	1.05
	P-8000	AC 21-1	0.75	0.75	0.720	0.825	1640	0.07	122	0.42
	P-8000	HV8-1	0.75	0.75	0.720	0.825	4130	0.07	306	1.05
	P-8000	HV6-3	0.75	0.75	0.720	0.825	4130	0.07	306	1.05
								1.26	**5924.97**	**20.22**
	P-2350	Hot Water Pump	1.0	0.75	0.760	0.855	6577	0.08	538	1.84
	P-8000	EF 21-3	1.0	0.75	0.760	0.855	8760	0.08	717	2.45
	P-8000	EF2-1	1.0	0.75	0.760	0.855	4130	0.08	338	1.15
	P-8000	HV4-1A	1.0	0.75	0.760	0.855	4130	0.08	338	1.15
	P-8000	EF2-2	1.0	0.75	0.760	0.855	4130	0.08	338	1.15
	P-8000	PRV6-1	1.0	0.75	0.760	0.855	4130	0.08	338	1.15
	P-8000	EF7-4	1.0	0.75	0.760	0.855	4130	0.08	338	1.15
	P-8000	HV4-1B	1.0	0.75	0.760	0.855	4130	0.08	338	1.15
								0.65	**3281.50**	**11.20**
	P-2160	Hot Water Pump	1.5	0.75	0.775	0.860	6577	0.11	704	2.40
	P-2060	Chilled Water Pump	1.5	0.75	0.775	0.860	2183	0.11	234	0.80
	P-2350	Chilled Water Pump	1.5	0.75	0.775	0.860	2183	0.11	234	0.80
	P-1953	CW / HW Pump	1.5	1.00	0.775	0.860	8029	0.14	1146	3.91
	P-8142	RF-1	1.5	0.75	0.775	0.860	6570	0.11	703	2.40
	P-2352	Chilled Water Pump	1.5	0.75	0.775	0.860	2183	0.11	234	0.80

LINE NO.	BLDG NO.	MOTOR APPLICATION	MOTOR SIZE (HP)	PART. LOAD FACTOR (0.00)	MOTOR EFFICIENCY EXISTING	NEW	HOURS OF OPERATION (HRS/YR)	ELECTRICAL DEMAND REDUCTION (kW)	ANNUAL ELECTRICAL ENERGY SAVINGS (kWh/YR)	(MBTU)
	P-2052	CW / HW Pump	1.5	1.00	0.775	0.860	8029	0.14	1146	3.91
	P-2160	Chilled Water Pump	1.5	0.75	0.775	0.860	2183	0.11	234	0.80
	P-2074	CW / HW Pump	1.5	1.00	0.775	0.860	5744	0.14	820	2[illegible]
	P-8000	HV7-2	1.5	0.75	0.775	0.860	4130	0.11	442	1.51
	P-8142	MAU-6	1.5	0.75	0.775	0.860	6570	0.11	703	2.40
	P-8000	HV6-1	1.5	0.75	0.775	0.860	4130	0.11	442	1.51
	P-8000	HV6-2	1.5	0.75	0.775	0.860	4130	0.11	442	1.51
								1.50	**7482.37**	**25.54**
	P-8000	EF4-1	2.0	0.75	0.790	0.865	4130	0.12	507	1.73
	P-8142	UH-3B	2.0	0.75	0.790	0.865	6570	0.12	807	2.75
	P-2071	CW / HW Pump	2.0	1.00	0.790	0.865	7947	0.16	1301	4.44
	P-8142	UH-3D	2.0	0.75	0.790	0.865	6570	0.12	807	2.75
	P-2070	CW / HW Pump	2.0	1.00	0.790	0.865	6475	0.16	1060	3.62
	P-8142	UH-3C	2.0	0.75	0.790	0.865	6570	0.12	807	2.75
	P-8000	PRV21-2	2.0	0.75	0.790	0.865	8760	0.12	1076	3.67
	P-8142	UH-3E	2.0	0.75	0.790	0.865	6570	0.12	807	2.75
	P-8142	UH-3F	2.0	0.75	0.790	0.865	6570	0.12	807	2.75
	P-8142	UH-3A	2.0	0.75	0.790	0.865	6570	0.12	807	2.75
								1.31	**8786.04**	**29.99**
	P-2700	Chilled Water Pump	3.0	0.75	0.810	0.890	2183	0.19	407	1.39
	P-2153	CW / HW Pump	3.0	1.00	0.810	0.890	7206	0.25	1790	6.11
	P-8030	EF-19A	3.0	0.75	0.810	0.890	4380	0.19	816	2[illegible]
	P-2700	Air Handling Unit	3.0	0.75	0.810	0.890	8760	0.19	1632	5.57
	P-2700	Hot Water Pump	3.0	0.75	0.810	0.890	6577	0.19	1225	4.18
	P-1950	CW / HW Pump	3.0	1.00	0.810	0.890	8029	0.25	1994	6.81
	P-2452	CW / HW Pump	3.0	1.00	0.810	0.890	8240	0.25	2046	6.98
	P-8030	EF-19B	3.0	0.75	0.810	0.890	4380	0.19	816	2.78
	P-8142	RF-2	3.0	0.75	0.810	0.890	6570	0.19	1224	4.18
	P-8000	HV9-1	3.0	0.75	0.810	0.890	4130	0.19	769	2.63
								2.05	**12718.32**	**43.41**
	P-8000	PRV1-4	5.0	0.75	0.830	0.896	4130	0.25	1025	3.50
	P-2073	CW / HW Pump	5.0	1.00	0.830	0.896	8760	0.33	2900	9.90
	P-2054	CW / HW Pump (Est.)	5.0	1.00	0.830	0.896	7216	0.33	2389	8.15
	P-2051	CW / HW Pump	5.0	1.00	0.830	0.896	7206	0.33	2385	8.14
	P-1954	CW / HW Pump	5.0	1.00	0.830	0.896	7206	0.33	2385	8.14
	P-2150	CW / HW Pump	5.0	1.00	0.830	0.896	6696	0.33	2217	7.57
	P-8000	PRV3-3	5.0	0.75	0.830	0.896	4130	0.25	1025	3.50
	P-8000	PRV2-1	5.0	0.75	0.830	0.896	4130	0.25	1025	3.50
	P-8000	AHU 21-3	5.0	0.75	0.830	0.896	8760	0.25	2175	7.42
	P-8000	PRV1-3	5.0	0.75	0.830	0.896	4130	0.25	1025	3.50
	P-8000	EF1-4	5.0	0.75	0.830	0.896	4130	0.25	1025	3.50
	P-2060	Hot Water Pump	5.0	0.75	0.830	0.896	6577	0.25	1633	5[illegible]
	P-1951	CW / HW Pump	5.0	1.00	0.830	0.896	7947	0.33	2631	8.98
	P-1952	CW / HW Pump	5.0	1.00	0.830	0.896	8029	0.33	2658	9.07
	P-2450	CW / HW Pump	5.0	1.00	0.830	0.896	8240	0.33	2728	9.31
	P-2451	CW / HW Pump	5.0	1.00	0.830	0.896	8240	0.33	2728	9.31

LINE NO.	BLDG NO.	MOTOR APPLICATION	MOTOR SIZE (HP)	PART. LOAD FACTOR (0.00)	MOTOR EFFICIENCY EXISTING	MOTOR EFFICIENCY NEW	HOURS OF OPERATION (HRS/YR)	ELECTRICAL DEMAND REDUCTION (kW)	ANNUAL ELECTRICAL ENERGY SAVINGS (kWh/YR)	ANNUAL ELECTRICAL ENERGY SAVINGS (MBTU)
	P-8000	AHU 21-1	5.0	0.75	0.830	0.896	8760	0.25	2175	7.42
	P-2251	CW / HW Pump	5.0	1.00	0.830	0.896	7509	0.33	2486	8.48
	P-2252	CW / HW Pump	5.0	1.00	0.830	0.896	6284	0.33	2080	7.10
	P-2253	CW / HW Pump	5.0	1.00	0.830	0.896	8760	0.33	2900	9.90
	P-2151	CW / HW Pump	5.0	1.00	0.830	0.896	8760	0.33	2900	9.90
	P-2050	CW / HW Pump	5.0	1.00	0.830	0.896	8029	0.33	2658	9.07
	P-1853	Hot Water Pump	5.0	0.75	0.830	0.896	6577	0.25	1633	5.57
	P-2453	CW / HW Pump	5.0	1.00	0.830	0.896	8240	0.33	2728	9.31
	P-2254	CW / HW Pump	5.0	1.00	0.830	0.896	8760	0.33	2900	9.90
	P-2152	CW / HW Pump	5.0	1.00	0.830	0.896	7947	0.33	2631	8.98
	P-2454	CW / HW Pump	5.0	1.00	0.830	0.896	8240	0.33	2728	9.31
	P-8000	HV7-1	5.0	0.75	0.830	0.896	4130	0.25	1025	3.50
	P-2072	CW / HW Pump	5.0	1.00	0.830	0.896	7206	0.33	2385	8.14
								8.77	**63182.11**	**215.64**
	P-8142	HV-1	7.5	0.75	0.845	0.914	6570	0.37	2463	8.41
	P-8000	AHU 21-2	7.5	0.75	0.845	0.914	8760	0.37	3284	11.21
	P-8030	HVU-1	7.5	0.75	0.845	0.914	6570	0.37	2463	8.41
	P-8000	PRV3-2	7.5	0.75	0.845	0.914	4130	0.37	1548	5.28
	P-8000	RTV-1 MUA	7.5	0.75	0.845	0.914	4130	0.37	1548	5.28
	P-8142	MZU-1	7.5	0.75	0.845	0.914	6570	0.37	2463	8.41
	P-8000	RF21-1	7.5	0.75	0.845	0.914	8760	0.37	3284	11.21
	P-8000	PRV1-6	7.5	0.75	0.845	0.914	4130	0.37	1548	5.28
	P-8000	RF21-2	7.5	0.75	0.845	0.914	8760	0.37	3284	11.21
	P-8000	RT-2 MUA	7.5	0.75	0.845	0.914	4130	0.37	1548	5.28
	P-8000	EF1-1	7.5	0.75	0.845	0.914	4130	0.37	1548	5.28
	P-2160	Air Handling Unit	7.5	0.75	0.845	0.914	8760	0.37	3284	11.21
	P-2060	Air Handling Unit	7.5	0.75	0.845	0.914	8760	0.37	3284	11.21
								4.87	**31551.01**	**107.68**
	P-2352	Air Handling Unit	10.0	0.75	0.860	0.917	8760	0.40	3543	12.09
	P-8000	RT-1F MUA	10.0	0.75	0.860	0.917	4130	0.40	1670	5.70
	P-1853	Air Handling Unit	10.0	0.75	0.860	0.917	8760	0.40	3543	12.09
	P-8000	RT-1C MUA	10.0	0.75	0.860	0.917	4130	0.40	1670	5.70
	P-2350	Air Handling Unit	10.0	0.75	0.860	0.917	8760	0.40	3543	12.09
	P-8000	RT-1B MUA	10.0	0.75	0.860	0.917	4130	0.40	1670	5.70
	P-8000	RT-1E MUA	10.0	0.75	0.860	0.917	4130	0.40	1670	5.70
	P-8000	RT-1D MUA	10.0	0.75	0.860	0.917	4130	0.40	1670	5.70
	P-8000	RT-3A MUA	10.0	0.75	0.860	0.917	4130	0.40	1670	5.70
	P-2700	Air Handling Unit	10.0	0.75	0.860	0.917	8760	0.40	3543	12.09
	P-8000	RT-3C MUA	10.0	0.75	0.860	0.917	4130	0.40	1670	5.70
	P-8000	RT-3B MUA	10.0	0.75	0.860	0.917	4130	0.40	1670	5.70
	P-8000	RT-1A MUA	10.0	0.75	0.860	0.917	4130	0.40	1670	5.70
								5.26	**29201.46**	**99.66**
	P-8030	EF-2	15.0	0.75	0.867	0.924	6570	0.60	3923	13.39
	P-8030	HV-2	15.0	0.75	0.867	0.924	6570	0.60	3923	13.39
								1.19	**7846.40**	**26.78**
	P-8000	RT-4B MUA	20.0	0.75	0.885	0.930	4130	0.61	2527	8.62

LINE NO.	BLDG NO.	MOTOR APPLICATION	MOTOR SIZE (HP)	PART. LOAD FACTOR (0.00)	MOTOR EFFICIENCY EXISTING	MOTOR EFFICIENCY NEW	HOURS OF OPERATION (HRS/YR)	ELECTRICAL DEMAND REDUCTION (kW)	ANNUAL ELECTRICAL ENERGY SAVINGS (kWh/YR)	ANNUAL ELECTRICAL ENERGY SAVINGS (MBTU)
	P-8000	RT-4A MUA	20.0	0.75	0.885	0.930	4130	0.61	2527	8.62
								1.22	**5053.55**	**17.25**
	P-8030	EF-4A	25.0	0.75	0.894	0.935	6570	0.69	4508	15.38
	P-8030	HV-4A	25.0	0.75	0.894	0.935	6570	0.69	4508	15.38
	P-8030	EF-3	25.0	0.75	0.894	0.935	6570	0.69	4508	15.38
	P-8030	HV-3	25.0	0.75	0.894	0.935	6570	0.69	4508	15.38
								2.74	**18030.19**	**61.54**
	P-8030	HV-4B	30.0	0.75	0.902	0.938	6570	0.71	4692	16.01
	P-8030	EF-4B	30.0	0.75	0.902	0.938	6570	0.71	4692	16.01
								1.43	**9384.47**	**32.03**
	P-8030	EF-5	40.0	0.75	0.906	0.943	6570	0.97	6368	21.73
	P-8030	HV-5	40.0	0.75	0.906	0.943	6570	0.97	6368	21.73
	P-8030	EF-7	40.0	0.75	0.906	0.943	6570	0.97	6368	21.73
	P-8030	HV-6	40.0	0.75	0.906	0.943	6570	0.97	6368	21.73
	P-8030	EF-6	40.0	0.75	0.906	0.943	6570	0.97	6368	21.73
	P-8030	HV-7	40.0	0.75	0.906	0.943	6570	0.97	6368	21.73
								5.82	38206.61	130.40

EMC ENGINEERS, INC.
ENERGY SAVINGS ESTIMATE - UPGRADE EXISTING MOTORS TO HIGH EFFICIENCY MOTORS

PROJECT: UPDATE EXISTING EEAP STUDY
LOCATION: FORT CARSON, COLORADO
PHASE: INTERIM
PREPARED BY: A. NIEMEYER

CLIENT PROJECT ENG R.W. WHITE
CLIENT PROJECT NO:
EMC PROJECT NO: 2102-001
DATE: 07-Apr-93

LINE NO.	BLDG NO.	MOTOR APPLICATION	MOTOR SIZE (HP)	PART. LOAD FACTOR (0.00)	MOTOR EFFICIENCY EXISTING	MOTOR EFFICIENCY NEW	HOURS OF OPERATION (HRS/YR)	ELECTRICAL DEMAND REDUCTION (kW)	ANNUAL ELECTRICAL ENERGY SAVINGS (kWh/YR)	ANNUAL ELECTRICAL ENERGY SAVINGS (MBTU)
1	P-1853	Air Handling Unit	10.0	0.75	0.860	0.917	8760	0.40	3543	12.09
2	P-1853	Air Handling Unit	5.0	0.75	0.830	0.896	NOT USED			
3	P-1853	Hot Water Pump	5.0	0.75	0.830	0.896	6577	0.25	1633	5.57
4	P-1853	Hot Water Pump	0.5	0.75	0.600	0.790	NOT USED			
5	P-1853	Chilled Water Pump	1.0	0.75	HIGH EFFICIENCY MOTOR					
6	P-1950	CW / HW Pump	3.0	1.00	0.810	0.890	8029	0.25	1994	6.81
7	P-1951	CW / HW Pump	5.0	1.00	0.830	0.896	7947	0.33	2631	8.98
8	P-1952	CW / HW Pump	5.0	1.00	0.830	0.896	8029	0.33	2658	9.07
9	P-1953	CW / HW Pump	1.5	1.00	0.775	0.860	8029	0.14	1146	3.91
10	P-1954	CW / HW Pump	5.0	1.00	0.830	0.896	7206	0.33	2385	8.14
11	P-2050	CW / HW Pump	5.0	1.00	0.830	0.896	8029	0.33	2658	9.07
12	P-2051	CW / HW Pump	5.0	1.00	0.830	0.896	7206	0.33	2385	8.14
13	P-2052	CW / HW Pump	1.5	1.00	0.775	0.860	8029	0.14	1146	3.91
14	P-2054	CW / HW Pump (Est.)	5.0	1.00	0.830	0.896	7216	0.33	2389	8.15
15	P-2060	Air Handling Unit	7.5	0.75	0.845	0.914	8760	0.37	3284	11.21
16	P-2060	Air Handling Unit	5.0	0.75	0.830	0.896	NOT USED			
17	P-2060	Hot Water Pump	5.0	0.75	0.830	0.896	6577	0.25	1633	5.57
18	P-2060	Hot Water Pump	0.33	0.75	0.580	0.680	NOT USED			
19	P-2060	Chilled Water Pump	1.5	0.75	0.775	0.860	2183	0.11	234	0.80
20	P-2070	CW / HW Pump	2.0	1.00	0.790	0.865	6475	0.16	1060	3.62
21	P-2071	CW / HW Pump	2.0	1.00	0.790	0.865	7947	0.16	1301	4.44
22	P-2072	CW / HW Pump	5.0	1.00	0.830	0.896	7206	0.33	2385	8.14
23	P-2073	CW / HW Pump	5.0	1.00	0.830	0.896	8760	0.33	2900	9.90
24	P-2074	CW / HW Pump	1.5	1.00	0.775	0.860	5744	0.14	820	2.80
25	P-2150	CW / HW Pump	5.0	1.00	0.830	0.896	6696	0.33	2217	7.57
26	P-2151	CW / HW Pump	5.0	1.00	0.830	0.896	8760	0.33	2900	9.90
27	P-2152	CW / HW Pump	5.0	1.00	0.830	0.896	7947	0.33	2631	8.98
28	P-2153	CW / HW Pump	3.0	1.00	0.810	0.890	7206	0.25	1790	6.11
29	P-2154	CW / HW Pump	5.0	1.00	HIGH EFFICIENCY MOTOR					
30	P-2160	Air Handling Unit	7.5	0.75	0.845	0.914	8760	0.37	3284	11.21
31	P-2160	Air Handling Unit	3.0	0.75	0.810	0.890	NOT USED			
32	P-2160	Hot Water Pump	1.5	0.75	0.775	0.860	6577	0.11	704	2.40
33	P-2160	Hot Water Pump	1.0	0.75	0.760	0.855	NOT USED			
34	P-2160	Chilled Water Pump	1.5	0.75	0.775	0.860	2183	0.11	234	0.80
35	P-2251	CW / HW Pump	5.0	1.00	0.830	0.896	7509	0.33	2486	8.48
36	P-2252	CW / HW Pump	5.0	1.00	0.830	0.896	6284	0.33	2080	7.10
37	P-2253	CW / HW Pump	5.0	1.00	0.830	0.896	8760	0.33	2900	9.90
38	P-2254	CW / HW Pump	5.0	1.00	0.830	0.896	8760	0.33	2900	9.90
39										
40		SUBTOTAL						8.19	62308.0	212.66

EMC ENGINEERS, INC.

ENERGY SAVINGS ESTIMATE - UPGRADE EXISTING MOTORS TO HIGH EFFICIENCY MOTORS

PROJECT:	UPDATE EXISTING EEAP STUDY	CLIENT PROJECT ENG	R.W. WHITE
LOCATION:	FORT CARSON, COLORADO	CLIENT PROJECT NO:	
PHASE:	INTERIM	EMC PROJECT NO:	2102-001
PREPARED BY:	A. NIEMEYER	DATE:	07-Apr-93

LINE NO.	BLDG NO.	MOTOR APPLICATION	MOTOR SIZE (HP)	PART. LOAD FACTOR (0.0)	MOTOR EFFICIENCY EXISTING	MOTOR EFFICIENCY NEW	HOURS OF OPERATION (HRS/YR)	ELECTRICAL DEMAND REDUCTION (kW)	ANNUAL ELECTRICAL ENERGY SAVINGS (kWh/YR)	ANNUAL ELECTRICAL ENERGY SAVINGS (MBTU)
1	P-2350	Air Handling Unit	10.0	0.75	0.860	0.917	8760	0.40	3543	12.09
2	P-2350	Hot Water Pump	1.0	0.75	0.760	0.855	6577	0.08	538	1.84
3	P-2350	Chilled Water Pump	1.5	0.75	0.775	0.860	2183	0.11	234	0.80
4	P-2352	Air Handling Unit	10.0	0.75	0.860	0.917	8760	0.40	3543	12.09
5	P-2352	Hot Water Pump	0.75	0.75	0.720	0.825	6577	0.07	488	1.67
6	P-2352	Chilled Water Pump	1.5	0.75	0.775	0.860	2183	0.11	234	0.80
7	P-2450	CW / HW Pump	5.0	1.00	0.830	0.896	8240	0.33	2728	9.31
8	P-2451	CW / HW Pump	5.0	1.00	0.830	0.896	8240	0.33	2728	9.31
9	P-2452	CW / HW Pump	3.0	1.00	0.810	0.890	8240	0.25	2046	6.98
10	P-2453	CW / HW Pump	5.0	1.00	0.830	0.896	8240	0.33	2728	9.31
11	P-2454	CW / HW Pump	5.0	1.00	0.830	0.896	8240	0.33	2728	9.31
12	P-2700	Air Handling Unit	10.0	0.75	0.860	0.917	8760	0.40	3543	12.09
13	P-2700	Air Handling Unit	3.0	0.75	0.810	0.890	8760	0.19	1632	5.57
14	P-2700	Hot Water Pump	3.0	0.75	0.810	0.890	6577	0.19	1225	4.18
15	P-2700	Chilled Water Pump	3.0	0.75	0.810	0.890	2183	0.19	407	1.39
16	P-8000	RTV-1 MUA	7.5	0.75	0.845	0.914	4130	0.37	1548	5.28
17	P-8000	RT-1A MUA	10.0	0.75	0.860	0.917	4130	0.40	1670	5[illegible]
18	P-8000	RT-1B MUA	10.0	0.75	0.860	0.917	4130	0.40	1670	5.70
19	P-8000	RT-1C MUA	10.0	0.75	0.860	0.917	4130	0.40	1670	5.70
20	P-8000	RT-1D MUA	10.0	0.75	0.860	0.917	4130	0.40	1670	5.70
21	P-8000	RT-1E MUA	10.0	0.75	0.860	0.917	4130	0.40	1670	5.70
22	P-8000	RT-1F MUA	10.0	0.75	0.860	0.917	4130	0.40	1670	5.70
23	P-8000	RT-2 MUA	7.5	0.75	0.845	0.914	4130	0.37	1548	5.28
24	P-8000	RT-3A MUA	10.0	0.75	0.860	0.917	4130	0.40	1670	5.70
25	P-8000	RT-3B MUA	10.0	0.75	0.860	0.917	4130	0.40	1670	5.70
26	P-8000	RT-3C MUA	10.0	0.75	0.860	0.917	4130	0.40	1670	5.70
27	P-8000	RT-4A MUA	20.0	0.75	0.885	0.930	4130	0.61	2527	8.62
28	P-8000	RT-4B MUA	20.0	0.75	0.885	0.930	4130	0.61	2527	8.62
29	P-8000	EF1-1	7.5	0.75	0.845	0.914	4130	0.37	1548	5.28
30	P-8000	PRV1-3	5.0	0.75	0.830	0.896	4130	0.25	1025	3.50
31	P-8000	PRV1-4	5.0	0.75	0.830	0.896	4130	0.25	1025	3.50
32	P-8000	PRV1-5	0.5	0.75	0.600	0.790	4130	0.11	463	1.58
33	P-8000	PRV1-6	7.5	0.75	0.845	0.914	4130	0.37	1548	5.28
34	P-8000	EF1-2	0.75	0.75	0.720	0.825	4130	0.07	306	1.05
35	P-8000	EF1-3	0.75	0.75	0.720	0.825	4130	0.07	306	1.05
36	P-8000	PRV2-1	5.0	0.75	0.830	0.896	4130	0.25	1025	3.50
37	P-8000	EF2-1	1.0	0.75	0.760	0.855	4130	0.08	338	1[illegible]
38	P-8000	PRV3-2	7.5	0.75	0.845	0.914	4130	0.37	1548	5.28
39	P-8000	EF1-4	5.0	0.75	0.830	0.896	4130	0.25	1025	3.50
40		SUBTOTAL						11.79	61,682.9	210.52

EMC ENGINEERS, INC.
ENERGY SAVINGS ESTIMATE - UPGRADE EXISTING MOTORS TO HIGH EFFICIENCY MOTORS

PROJECT: UPDATE EXISTING EEAP STUDY
LOCATION: FORT CARSON, COLORADO
PHASE: INTERIM
PREPARED BY: A. NIEMEYER

CLIENT PROJECT ENG R.W. WHITE
CLIENT PROJECT NO:
EMC PROJECT NO: 2102-001
DATE: 07-Apr-93

LINE NO.	BLDG NO.	MOTOR APPLICATION	MOTOR SIZE (HP)	PART. LOAD FACTOR (0.0)	MOTOR EFFICIENCY		HOURS OF OPERATION (HRS/YR)	ELECTRICAL DEMAND REDUCTION (kW)	ANNUAL ELECTRICAL ENERGY SAVINGS	
					EXISTING	NEW			(kWh/YR)	(MBTU)
1	P-8000	EF2-2	1.0	0.75	0.760	0.855	4130	0.08	338	1.15
2	P-8000	EF2-3	0.5	0.75	0.600	0.790	4130	0.11	463	1.58
3	P-8000	PRV3-3	5.0	0.75	0.830	0.896	4130	0.25	1025	3.50
4	P-8000	AHU 21-1	5.0	0.75	0.830	0.896	8760	0.25	2175	7.42
5	P-8000	EF 21-1	5.0	0.75	HIGH EFFICIENCY MOTOR					
6	P-8000	AHU 21-2	7.5	0.75	0.845	0.914	8760	0.37	3284	11.21
7	P-8000	EF 21-2	5.0	0.75	HIGH EFFICIENCY MOTOR					
8	P-8000	AHU 21-3	5.0	0.75	0.830	0.896	8760	0.25	2175	7.42
9	P-8000	EF 21-3	1.0	0.75	0.760	0.855	8760	0.08	717	2.45
10	P-8000	AC 9-1	0.75	0.75	0.720	0.825	1640	0.07	122	0.42
11	P-8000	AC 21-1	0.75	0.75	0.720	0.825	1640	0.07	122	0.42
12	P-8000	RF21-1	7.5	0.75	0.845	0.914	8760	0.37	3284	11.21
13	P-8000	PRV21-2	2.0	0.75	0.790	0.865	8760	0.12	1076	3.67
14	P-8000	RF21-2	7.5	0.75	0.845	0.914	8760	0.37	3284	11.21
15	P-8000	HV4-1A	1.0	0.75	0.760	0.855	4130	0.08	338	1.15
16	P-8000	HV4-1B	1.0	0.75	0.760	0.855	4130	0.08	338	1.15
17	P-8000	HV6-1	1.5	0.75	0.775	0.860	4130	0.11	442	1.51
18	P-8000	HV6-2	1.5	0.75	0.775	0.860	4130	0.11	442	1.51
19	P-8000	HV6-3	0.75	0.75	0.720	0.825	4130	0.07	306	1.05
20	P-8000	HV7-1	5.0	0.75	0.830	0.896	4130	0.25	1025	3.50
21	P-8000	HV7-2	1.5	0.75	0.775	0.860	4130	0.11	442	1.51
22	P-8000	HV8-1	0.75	0.75	0.720	0.825	4130	0.07	306	1.05
23	P-8000	HV9-1	3.0	0.75	0.810	0.890	4130	0.19	769	2.63
24	P-8000	EF7-4	1.0	0.75	0.760	0.855	4130	0.08	338	1.15
25	P-8000	PRV8-1	0.5	0.75	0.600	0.790	4130	0.11	463	1.58
26	P-8000	PRV9-1	0.75	0.75	0.720	0.825	4130	0.07	306	1.05
27	P-8000	PRV4-1	0.75	0.75	0.720	0.825	4130	0.07	306	1.05
28	P-8000	PRV4-2	0.75	0.75	0.720	0.825	4130	0.07	306	1.05
29	P-8000	PRV4-3	0.75	0.75	0.720	0.825	4130	0.07	306	1.05
30	P-8000	PRV7-3	0.5	0.75	0.600	0.790	4130	0.11	463	1.58
31	P-8000	PRV7-4	0.5	0.75	0.600	0.790	4130	0.11	463	1.58
32	P-8000	EF4-1	2.0	0.75	0.790	0.865	4130	0.12	507	1.73
33	P-8000	PRV6-1	1.0	0.75	0.760	0.855	4130	0.08	338	1.15
34	P-8000	PRV6-2	0.75	0.75	0.720	0.825	4130	0.07	306	1.05
35	P-8000	PRV6-3	0.5	0.75	0.600	0.790	4130	0.11	463	1.58
36										
37										
38										
39										
40		SUBTOTAL						4.59	27,040.1	92.29

EMC ENGINEERS, INC.
ENERGY SAVINGS ESTIMATE - UPGRADE EXISTING MOTORS TO HIGH EFFICIENCY MOTORS

PROJECT: UPDATE EXISTING EEAP STUDY
LOCATION: FORT CARSON, COLORADO
PHASE: INTERIM
PREPARED BY: A. NIEMEYER

CLIENT PROJECT ENG R.W. WHITE
CLIENT PROJECT NO:
EMC PROJECT NO: 2102-001
DATE: 07-Apr-93

LINE NO.	BLDG NO.	MOTOR APPLICATION	MOTOR SIZE (HP)	PART. LOAD FACTOR (0.0)	MOTOR EFFICIENCY		HOURS OF OPERATION (HRS/YR)	ELECTRICAL DEMAND REDUCTION (kW)	ANNUAL ELECTRICAL ENERGY SAVINGS	
					EXISTING	NEW			(kWh/YR)	(MBTU)
1	P-8030	HVU-1	7.5	0.75	0.845	0.914	6570	0.37	2463	8.41
2	P-8030	HV-2	15.0	0.75	0.867	0.924	6570	0.60	3923	13.39
3	P-8030	EF-2	15.0	0.75	0.867	0.924	6570	0.60	3923	13.39
4	P-8030	HV-3	25.0	0.75	0.894	0.935	6570	0.69	4508	15.38
5	P-8030	EF-3	25.0	0.75	0.894	0.935	6570	0.69	4508	15.38
6	P-8030	HV-4A	25.0	0.75	0.894	0.935	6570	0.69	4508	15.38
7	P-8030	EF-4A	25.0	0.75	0.894	0.935	6570	0.69	4508	15.38
8	P-8030	HV-4B	30.0	0.75	0.902	0.938	6570	0.71	4692	16.01
9	P-8030	EF-4B	30.0	0.75	0.902	0.938	6570	0.71	4692	16.01
10	P-8030	HV-5	40.0	0.75	0.906	0.943	6570	0.97	6368	21.73
11	P-8030	EF-5	40.0	0.75	0.906	0.943	6570	0.97	6368	21.73
12	P-8030	HV-6	40.0	0.75	0.906	0.943	6570	0.97	6368	21.73
13	P-8030	EF-6	40.0	0.75	0.906	0.943	6570	0.97	6368	21.73
14	P-8030	HV-7	40.0	0.75	0.906	0.943	6570	0.97	6368	21.73
15	P-8030	EF-7	40.0	0.75	0.906	0.943	6570	0.97	6368	21.73
16										
17										
18	P-8142	MZU-1	7.5	0.75	0.845	0.914	6570	0.37	2463	8.41
19	P-8142	RF-1	1.5	0.75	0.775	0.860	6570	0.11	703	2.40
20	P-8142	HV-1	7.5	0.75	0.845	0.914	6570	0.37	2463	8.41
21	P-8142	RF-2	3.0	0.75	0.810	0.890	6570	0.19	1224	4.18
22	P-8142	MAU-3	0.5	0.75	0.600	0.790	6570	0.11	737	2.51
23	P-8142	MAU-4	0.5	0.75	0.600	0.790	6570	0.11	737	2.51
24	P-8142	MAU-5	0.5	0.75	0.600	0.790	6570	0.11	737	2.51
25	P-8142	MAU-6	1.5	0.75	0.775	0.860	6570	0.11	703	2.40
26	P-8142	MAU-7	0.5	0.75	0.600	0.790	6570	0.11	737	2.51
27	P-8142	MAU-8	0.5	0.75	0.600	0.790	6570	0.11	737	2.51
28	P-8142	UH-1A	0.75	0.75	0.720	0.825	6570	0.07	487	1.66
29	P-8142	UH-1B	0.75	0.75	0.720	0.825	6570	0.07	487	1.66
30	P-8142	UH-1C	0.75	0.75	0.720	0.825	6570	0.07	487	1.66
31	P-8142	UH-1D	0.75	0.75	0.720	0.825	6570	0.07	487	1.66
32	P-8142	UH-1E	0.75	0.75	0.720	0.825	6570	0.07	487	1.66
33	P-8142	UH-3A	2.0	0.75	0.790	0.865	6570	0.12	807	2.75
34	P-8142	UH-3B	2.0	0.75	0.790	0.865	6570	0.12	807	2.75
35	P-8142	UH-3C	2.0	0.75	0.790	0.865	6570	0.12	807	2.75
36	P-8142	UH-3D	2.0	0.75	0.790	0.865	6570	0.12	807	2.75
37	P-8142	UH-3E	2.0	0.75	0.790	0.865	6570	0.12	807	2.[illegible]
38	P-8142	UH-3F	2.0	0.75	0.790	0.865	6570	0.12	807	2.75
39										
40		SUBTOTAL						14.38	94,448.7	322.35

EMC ENGINEERS, INC.
ENERGY SAVINGS ESTIMATE - UPGRADE EXISTING MOTORS TO HIGH EFFICIENCY MOTORS

PROJECT: UPDATE EXISTING EEAP STUDY
LOCATION: FORT CARSON, COLORADO
PHASE: INTERIM
PREPARED BY: A. NIEMEYER

CLIENT PROJECT ENG R.W. WHITE
CLIENT PROJECT NO:
EMC PROJECT NO: 2102-001
DATE: 07-Apr-93

LINE NO.	BLDG NO.	MOTOR APPLICATION	MOTOR SIZE (HP)	PART. LOAD FACTOR (0.0)	MOTOR EFFICIENCY		HOURS OF OPERATION (HRS/YR)	ELECTRICAL DEMAND REDUCTION (kW)	ANNUAL ELECTRICAL ENERGY SAVINGS	
					EXISTING	NEW			(kWh/YR)	(MBTU)
1	P-8030	EF-1	0.5	0.75	0.600	0.790	6570	0.11	737	2.51
2	P-8030	EF-19A	3.0	0.75	0.810	0.890	4380	0.19	816	2.78
3	P-8030	EF-19B	3.0	0.75	0.810	0.890	4380	0.19	816	2.78
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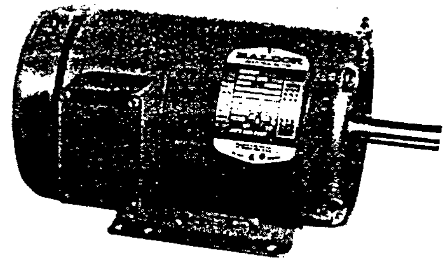
39		SUBTOTAL						0.48	2,368.4	8.08
40		TOTAL						39.43	247848.1	845.91



THREE PHASE

TEFC — RIGID BASE

1/8 THRU 7 1/2 H.P. **NEMA 42 THRU 256T**

Applications: Pumps, compressors, fans, conveyors, machine tools and other applications where three phase power is available.

Features: Ball bearings. Suitable for mounting in any position. Heavy gauge steel and cast iron frames. Most with open motor service factor.

H.P.	R.P.M. 60 HZ.	NEMA FRAME	CATALOG NO.	LIST PRICE	MULT. SYM.	TYPE	AP'X. SHPG. WGT.	% EFF. FULL LOAD	VOLT. CODE
1/8	1725	42	M3353	$166	DK	3313M	16	44.0	E
1/6	3450	42	M3354 d	169	DK	3313M	16	58.0	E
1/6	1725	42	M3355	189	DK	3316M	17	62.0	E
1/6	1140	48	M3452	195	DK	3408M	17	57.5	E
1/4	3450	42	M3356 d	191	DK	3316M	17	68.0	E
1/4	1725	48	M3454	151	LK	3410M	19	64.0	E
1/4	1140	48	M3455	216	DK	3411M	19	68.0	E
1/4	1140	56	M3531	224	BK	3411M	20	68.0	E
1/4	850	56	M3532	314	DK	3516M	30	55.0	E
1/3	3450	48	M3457	140	LK	3410M	19	70.0	E
1/3	1725	48	M3458	168	LK	3413M	20	68.0	E
1/3	1725	56	M3534	168	LK	3413M	21	68.0	E
1/3	1140	56	M3535	243	BK	3414M	22	70.0	E
1/3	850	56	M3536	343	DK	3520M	34	55.0	E
1/2	3450	48	M3460	162	BK	3410M	19	68.0	E
1/2	3450	56H	M3537	162	LK	3410M	20	68.0	E
1/2	1725	48	M3461	198	LK	3416M	22	74.0	E
1/2	1725	56	M3538	198	LK	3416M	22	74.0	E
1/2	1140	56	M3539	262	BK	3418M	24	72.0	E
1/2	850	56H	M3560 ••	385	DK	3524M	38	66.0	E
1/2	850	182	M3600	495	D1	3614M	47	62.0	E
3/4	3450	48	M3463	178	DK	3413M	20	74.0	E
3/4	3450	56	M3541	178	LK	3413M	21	74.0	E
3/4	1725	48	M3464	213	DK	3420M	25	75.5	E
3/4	1725	56	M3542	213	LK	3420M	26	75.5	E
3/4	1140	56H	M3543	268	LK	3524M	38	77.0	E
3/4	1140	143T	M3543T	268	L1	3524M	39	77.0	E
3/4	1140	182	M3601	390	D1	3614M	47	75.5	E
3/4	850	184	M3602	495	D1	3620M	53	68.0	E
1	3450	56	M3545	210	LK	3416M	23	75.5	E
1	1725	56	M3546	222	LK	3516M	31	77.0	E
1	1725	143T	M3546T	222	L1	3516M	32	77.0	E
1	1725	143T	EM3581T	395	B1	0524M	54	85.5	F
1	1725	143T	M3581T	289	B1	0516M	47	77.0	E
1	1725	182	M3603	355	D1	3614M	47	77.0	E
1	1140	56H	M3556	272	LK	3524M	38	75.5	E
1	1140	145T	M3556T	272	L1	3524M	38	75.5	E
1	1140	145T	M3582T	366	B1	0524M	53	75.5	E
1	1140	184	M3604	399	D1	3617M	50	77.0	E
1	850	182T	M3617T ••	542	D1	3623M	58	68.0	F
1 1/2	3450	56	M3550	233	BK	3516M	31	75.5	E
1 1/2	3450	143T	M3550T	225	L1	3516M	32	75.5	E
1 1/2	3450	143T	M3583T	298	B1	0516M	48	75.5	E
1 1/2	3450	182	M3605	370	D1	3614M	46	74.0	E
1 1/2	1725	56	M3554 ••	237	BK	3520M	34	78.5	E
1 1/2	1725	145T	M3554T ••	232	L1	3520M	35	78.5	E
1 1/2	1725	145T	EM3584T	410	B1	0528M	58	85.5	F
1 1/2	1725	145T	M3584T	295	B1	0520M	51	78.5	E
1 1/2	1725	184	M3606	397	D1	3617M	51	81.5	E
1 1/2	1140	56H	M3557 †	311	BK	3528M	41	75.5	F
1 1/2	1140	145T	M3557T †	301	L1	3528M	42	75.5	F
1 1/2	1140	182T	M3607T	316	L1	3623M	57	80.0	E
1 1/2	1140	182T	M3667T	401	B1	0623M	84	80.0	E
1 1/2	1140	184	M3607	427	D1	3623M	57	80.0	E
1 1/2	850	184T	M3618T †	643	D1	3628M	66	70.0	F
1 1/2	850	213	M3701	732	D1	3720M	82	70.0	E

H.P.	R.P.M. 60 HZ.	NEMA FRAME	CATALOG NO.	LIST PRICE	MULT. SYM.	TYPE	AP'X. SHPG. WGT.	% EFF. FULL LOAD	VOLT. CODE
2	3450	56H	M3555 ••	$258	LK	3524M	39	78.5	E
2	3450	145T	M3555T ••	258	L1	3524M	40	78.5	E
2	3450	145T	M3586T	336	B1	0524M	54	78.5	E
2	3450	184	M3608	397	D1	3617M	52	77.0	E
2	1725	56H	M3558 ••	245	LK	3528M	42	82.5	E
2	1725	145T	M3558T ••	245	L1	3528M	42	82.5	E
2	1750	145T	EM3587T	430	B1	0535M	65	86.5	F
2	1725	145T	M3587T	318	B1	0528M	56	82.5	E
2	1725	184	M3609	433	D1	3620M	55	82.5	E
2	1140	184T	M3614T	336	L1	3628M	65	80.0	E
2	1140	184T	M3664T	430	B1	0628M	88	80.0	E
2	1140	213	M3712	483	D1	3717M	78	78.5	E
2	850	213T	M3702T	816	D1	3726M	98	74.0	E
2	850	215	M3702	816	D1	3726M	97	74.0	E
3	3450	56H	M3559 †•	326	DK	3535M	50	82.5	E
3	3450	145T	M3559T †•	296	L1	3535M	51	82.5	E
3	3450	182T	EM3660T ••	421	B1	0628M	95	88.5	F
3	3450	182T	M3660T †•	402	B1	0620M	82	80.0	E
3	3450	182T	M3610T †•	315	L1	3620M	56	81.5	E
3	3450	184	M3610 †•	346	D1	3620M	56	81.5	E
3	1725	182T	EM3661T †•	451	B1	0628M	97	89.5	F
3	1725	182T	M3611T †•	288	L1	3535M	60	84.0	E
3	1725	182T	M3611T/36	308	L1	3623M	63	82.5	E
3	1725	182T	M3661T †•	412	B1	0623M	86	84.0	E
3	1725	184	M3611 †•	314	D1	3623M	59	82.5	E
3	1725	213	M3703	466	D1	3717M	76	81.5	E
3	1140	213T	EM3764T †•	648	D1	0735M	153	89.5	F
3	1140	213T	M3704T †•	424	L1	3726M	99	81.5	E
3	1140	215	M3704 †•	544	D1	3726M	98	81.5	F
3	850	215T	M3705T †	891	D1	3735M	114	77.0	[illegible]
5	3450	184T	EM3663T	516	B1	0634M	103	89.5	F
5	3450	184T	M3613T †•	363	L1	3628M	70	85.5	E
5	3450	184T	M3663T †•	513	B1	0634M	100	86.0	E
5	3450	213	M3706 †•	606	D1	3717M	81	81.5	E
5	1725	184T	EM3665T †•	478	B1	0640M	110	90.2	F
5	1725	184T	M3615T †	333	L1	3634M	75	85.5	E
5	1725	184T	M3665T †•	435	B1	0634M	99	84.0	E
5	1725	215	M3707 †•	591	D1	3723M	93	84.0	E
5	1140	215T	EM3768T †•	917	D1	0750M	178	89.5	F
5	1140	215T	M3708T †•	610	L1	3740M	126	84.0	E
5	1160	254U	M2275 †•	1110	D2	0924M	204	85.5	E
5	870	254T	M2280T †•	1449	D2	0928M	220	80.0	E
7 1/2	3450	184T	M3616T †	476	B1	3640M	88	87.5	E
7 1/2	3450	213T	EM3769T †•	677	B1	0735M	161	90.2	F
7 1/2	3450	213T	M3769T †•	638	B1	0723M	135	84.0	E
7 1/2	3450	213T	M3709T †•	536	L1	3723M	99	84.0	E
7 1/2	3450	215	M3709 †•	626	D1	3723M	99	84.0	E
7 1/2	1725	213T	EM3770T †•	651	B1	0735M	157	91.0	F
7 1/2	1725	213T	M3770T †•	571	B1	0735M	149	86.5	E
7 1/2	1725	213T	M3710T †•	424	L1	3735M	116	87.5	E
7 1/2	1725	213T	M3770T-9 †	598	D1	0735M	147	87.0	F
7 1/2	1760	254U	M2237	925	D2	0924M	204	85.5	E
7 1/2	1160	254T	EM2276T †•	1266	B2	0940M	261	90.2	F
7 1/2	1160	254T	M2276T †•	907	L2	0932M	224	84.0	F
7 1/2	1160	256U	M2276 †•	1334	D2	0932M	252	86.5	E
7 1/2	870	256T	M2401T †	1782	D2	0940M	269	84.0	F

NOTE: BALDOR NEMA 56H FRAMES WILL ALSO MOUNT AS
NEMA 56, 143T, 145T FRAMES WITH NEMA 56 FRAME SHAFT DIMENSIONS.
VOLTAGE @ 60 HZ: E = 208-230/460, F = 230/460 VOLTS
d = TO BE DISCONTINUED WHEN PRESENT STOCK IS DEPLETED.

SHADED RATINGS ARE CAST IRON FRAMES.

SIGNS AND SYMBOLS:

Catalog Information subject to engineering changes after printing, contact Baldor office for further information.

**	Class "B" Rise and Class "B" insulated
†	Class "F" Rise and Class "F" insulated
†*	Class "F" Insulated Motor with 1.15 Service Factor that operates within Class "B" temperature limits at rated horsepower
††	Class "H" Rise and Class "H" insulated
①	Class I Group D only
◇	These Close-Coupled Pump Motors (JP) are suitable for "West Coast Fit" Mounting.
□	These Motors are Totally-Enclosed, Non-Ventilated Continuous Duty.
+	These Brake Motors can be mounted for Vertical Mounting with Brake Above or Below Motor
✓	These Brake Motors can be mounted for Vertical Mounting with Brake Below Motor
§	These Agri-Duty Motors are Capacitor-Start, Induction-Run
▼	These Repulsion-Start Induction-Run Motors are rated 10 HP Continuous Duty, 15 HP One Hour Duty
#	These Resilient Mount Single Phase Motors have Moderate Starting Torque for Fan Applications
●	These SCR Motors have a 3:1 Speed Range at Constant Torque
d	Items to be Discontinued when Present Stock is Depleted

INSULATION CLASS: Absence of symbol(s) adjacent to catalog number generally indicates the motor is designed to operate within Class A temperature limits (even though Class B or better materials are used). Exceptions occur in DC Motors and Special Purpose motors. Contact a Baldor representative for information on a particular motor.

VOLTAGE/POWER SERVICE:

Voltage Code	
A	115/208-230 Volts, 60 HZ
B	115/230 Volts, 60 HZ
C	230 Volts, 60 HZ
D	208-230 Volts, 60 HZ
E	208-230/460 Volts, 60 HZ
F	230/460 Volts, 60 HZ
G	460 Volts, 60 HZ
H	575 Volts, 60 HZ
I	200 Volts, 60 HZ
J	110/220 Volts, 50 HZ
K	220/380/440 Volts, 50 HZ
L	115 Volts, 60 HZ
M	220 Volts, 50 HZ
N	380/460 Volts, 50/60 HZ
O	2300/4160 Volts, 60 HZ

ABBREVIATIONS: The Basic Baldor catalog number consists of a letter or letters and four non-significant numbers. A suffix letter(s) and/or number may also be part of catalog number. For example L3510 or L3510T. Prefix and suffix letters are defined below:

PREFIXES TO CATALOG NUMBERS:

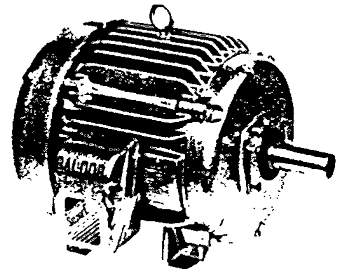
AEM	Automotive Motor (GM-7EHQ)
AF	Aeration Fan Motor
AM	Automotive Motor (GM-7EQ)
ANF	Auger Flange Motor
AO	Air Over Motor
AP	Subfractional HP Permanent Magnet Motor
B	Motor mounted spring set disc brake
BC	DC Motor Speed Control
BIM	BISSC Approved Motor
BMC	Brushless DC Motor Control
BTG	Tachometer Generator
C	NEMA C-Face with Rigid Base
CDP	Permanent Magnet SCR Drive Motor
CDPT	Permanent Magnet SCR Drive Motor with Integral Tach
CDPWD	Permanent Magnet SCR Drive Motor Washdown
CF	Condenser Fan Motor
CH	Direct Drive Fan Motor with Resilient Base
CP	Chemical Processing Corrosion Protected Motor
CSC	Checkout Stand Motor
D	Direct Current Shunt or Compound Motor
D (Pg. 80)	Definite Purpose Soft Start
DB	Brushless DC Motor
DE	Vacuum Pump Motor
DMG	Lifting Magnet Generator Motor
E	Super-E Premium Efficiency Motor
ECP	Super E Premium Efficiency, Chemical Processing, Corrosion Protected Motor
F	F-2 Mount Motor
FD	Farm Duty Motors
G	Subfractional HP Gear Motor
GC	Permanent Split Capacitor Right Angle Shaft Gearmotor
GCP	Permanent Split Capacitor Parallel Shaft Gearmotor
GD	Centrifugal Fan Motor
GP	Subfractional HP Permanent Magnet Gearmotor
GPP	Permanent Magnet Parallel Shaft Gearmotor
GS	Grain Stirring Motor
ID	Inverter Drive
IDM	Inverter Drive Motor
IM	Irrigation Drive Motor
IR	Instant Reversing Single Phase
J	Farm Motor NEMA 56J Stainless Steel Threaded Shaft with Drip-Cover and Automatic Thermal Overload
JM	NEMA JM Pump shaft and Face with Rigid Base
JP	NEMA JP Pump shaft and Face with Rigid Base
K	Model 34 Diameter Motor with 56 C-Face, less Base
L	Denotes Single Phase
LDG	Single Phase, Door and Gate Motors
M	Denotes Three Phase
M (Pg. 80)	Multipurpose Soft Start
MM	Metric Dimension Motor with Rigid Base
MVM	Metric Dimension Motor Flange Mount
MPM	Three Phase Metering Pump Motor
OF	Design D, High Slip Motor (Oil Field)
P	Pressure Washer Motor
PSC	Permanent Split Capacitor
R	Repulsion-Start, Induction-run Motor
RL&RM	Resilient Base (Cradle Mount)
S	Single Phase Soft Start
T	Torque Control Soft Start
UC	Universal Crop Dryer Motor
V	NEMA C-Face, Round Body, less Base
VJM	NEMA JM Pump Shaft and Face less Base
VLCP	P Base Vertical Pump Motor, Medium Thrust
VP	Permanent Magnet SCR Drive Motor with Metric Face or Flange
VPCP	P Base Vertical Pump Motor, High Thrust
VPM	Vertical Pump Motor
WC	West Coast Fit NEMA TCZ
WDM	Washdown Duty Motors
ZD	Vector Drive
ZDM	Vector Drive Motor

SUFFIXES TO CATALOG NUMBERS:

A	Automatic Thermal Overload
BV	Blower Vented
E	Electric Switch
M	Manual Thermal Overload
-4	460 Volt Winding
-5	575 Volt Winding
-8	200 Volt Winding
-9	NEMA Design C High Torque Winding
-50	Wound for 50 Hertz Service
-2341	2300/4160 Volt Winding
-I	Explosion-Proof, 1.15 Service Factor
-P	Partial Motor; Does not include pulley end plate (AC motors only)
/36	Full 180 Frame Band Diameter

OTHER ABBREVIATIONS USED:

C	Permanent Split Capacitor
LC	Capacitor-Start, Capacitor-Run Motor
L	Capacitor-Start, Induction-Run
S	Split Phase
T	NEMA "T" Frame Dimensions
TS	NEMA "TS" Frame Short Shaft
X	Explosion-Proof



THREE PHASE TEFC — RIGID BASE

10 THRU 500 H.P. **NEMA 215T THRU 5011L**

Applications: Pumps, compressors, fans, conveyors, machine tools and other applications where three phase power is available.

Features: Ball bearings. Suitable for mounting in any position. Heavy gauge steel and cast iron frames. Most with open motor service factor.

H.P.	R.P.M. 60 HZ.	NEMA FRAME	CATALOG NO.		LIST PRICE	MULT. SYM.	TYPE	AP'X. SHPG. WGT.	% EFF. FULL LOAD	VOLT. CODE
10	3450	215T	EM3771T	†*	$793	B1	0740M	170	91.0	F
10	3450	215T	M3771T	†*	682	B1	0735M	157	85.5	E
10	3450	215T	M3711T	†*	578	L1	3735M	121	85.5	E
10	3525	254U	M2393	†*	1036	D2	0924M	215	87.5	E
10	1725	215T	EM3774T	†*	732	B1	0750M	183	91.7	F
10	1725	215T	M3774T	†	616	B1	0740M	163	87.5	E
10	1725	215T	M3714T	†	516	L1	3740M	127	87.5	E
10	1725	215T	M3774T-9	† d	746	D1	0740M	162	87.0	F
10	1760	256U	M2238	†*	1159	D2	0932M	248	85.5	E
10	1160	256T	EM2332T	†*	1525	B2	0952M	277	90.2	F
10	1160	256T	M2332T	†*	1109	L2	0940M	251	85.5	F
10	1160	284U	M2332	†*	1702	D2	1028M	375	86.5	E
10	870	284T	M2402T	†*	2174	D2	1040M	364	84.0	F
15	3525	254T	EM2394T	†*	1112	B2	0940M	270	91.7	F
15	3450	215T	M3713T	†	823	B1	3744M	134	85.5	F
15	3525	254T	M2394T	†*	864	L2	0926M	238	86.5	F
15	3525	256U	M2394	†*	1076	D2	0932M	270	89.5	E
15	1760	254T	EM2333T	†*	1045	B2	0940M	253	92.4	F
15	1760	254T	M2333T	†*	842	L2	0932M	231	88.5	F
15	1760	254T	M2333T-9	†*	1045	D2	0936M	283	87.5	F
15	1760	284U	M2333	†*	1597	D2	1030M	346	87.5	E
15	1160	284T	EM4100T	†*	2120	D2	1050M	393	91.0	F
15	1160	284T	M4100T	†*	1476	L2	1040M	375	87.5	F
15	1160	324U	M4100	†*	2313	D2	1232M	446	89.5	E
15	870	286T	M2395T	†*	3056	D2	1050M	436	86.5	F
20	3525	256T	EM4106T	†*	1376	B2	0948M	285	92.4	F
20	3525	256T	M4106T	†*	1109	L2	0934M	262	88.5	F
20	3525	286U	M4106	†*	1642	D2	1036M	398	90.2	E
20	1760	256T	EM2334T	†*	1266	B2	0952M	290	93.0	F
20	1760	256T	M2334T	†*	1040	L2	0942M	265	89.5	F
20	1760	256T	M2334T-9	†* d	1239	D2	0948M	365	88.5	F
20	1760	286U	M2334	†*	1911	D2	1036M	384	88.5	E
20	1160	286T	EM4102T	†*	2511	D2	1060M	441	91.7	F
20	1160	286T	M4102T	†*	1882	B2	1050M	466	88.5	F
20	1160	326U	M4102	†*	2275	D2	1240M	493	90.2	E
20	870	324T	M4112T	†*	3150	D2	1250M	529	88.5	F
25	3525	256T	M4118T		1376	L2	0946M	280	91.0	F
25	3525	284TS	EM4107T	†*	1738	B2	1044M	398	93.0	F
25	3525	284TS	M4107T	†*	1389	L2	1032M	392	87.5	F
25	3525	324U	M4107	†*	2426	D2	1232M	396	88.5	F
25	1760	284T	EM4103T	†*	1658	B2	1050M	447	94.1	F
25	1760	284T	M4103T	†*	1285	L2	1034M	359	89.5	F
25	1760	284T	M4103T-9	†*	1620	D2	1044M	388	90.2	F
25	1760	324U	M4103	†*	2376	D2	1234M	458	91.7	E
25	1180	324T	EM4111T	†*	2974	D2	1256M	548	93.6	F
25	1160	324T	M4111T	†*	2259	B2	1248M	520	89.5	F
25	870	326T	M4116T	†*	3806	D2	1262M	586	89.5	F
30	3525	286TS	EM4108T	†*	2078	D2	1050M	417	93.0	F
30	3525	286TS	M4108T	†*	1598	L2	1038M	413	88.5	F
30	1760	286T	EM4104T	†*	1969	B2	1058M	436	94.1	F
30	1760	286T	M4104T	†*	1518	L2	1040M	380	90.2	F
30	1760	286T	M4104T-9	†* d	1912	D2	1050M	418	91.0	F
30	1760	326U	M4104	†*	2820	D2	1240M	498	92.4	E
30	1160	326T	EM4117T	†*	3425	D2	1262M	584	93.0	F
30	1160	326T	M4117T	†*	2605	B2	1256M	565	90.2	F
40	3525	324TS	EM4109T	†*	2598	D2	1256M	563	93.0	F
40	3525	324TS	M4109T	†*	2180	B2	1246M	523	88.5	F
40	1760	324T	EM4110T	†*	2574	B2	1258M	560	94.5	F
40	1760	324T	M4110T	†*	2016	L2	1240M	490	91.0	F
40	1160	364T	EM4308T	†*	4610	D2	1458M	785	93.6	F
40	1160	364T	M4308T	†*	3869	B2	1450M	700	90.2	F
50	3525	326TS	EM4114T	†*	3375	D2	1268M	625	93.6	F
50	3525	326TS	M4114T	†*	2613	B2	1256M	578	90.2	F
50	1760	326T	EM4115T	†*	2900	B2	1272M	650	95.0	F
50	1760	326T	M4115T	†*	2174	L2	1246M	526	91.7	F
50	1160	365T	EM4312T	†*	$5965	D2	1468M	807	93.6	F
50	1160	365T	M4312T	†*	4410	B2	1458M	750	91.0	F
60	3525	364TS	EM4310T	†*	4606	D2	1458M	748	94.1	F
60	3525	364TS	M4310T	†*	4046	B2	1440M	749	90.2	F
60	1760	364T	EM4314T	†*	4501	B2	1462M	784	95.0	F
60	1760	364T	M4314T	†*	3633	L2	1442M	673	92.4	F
60	1160	404T	EM4403T	†*	6230	D2	1672M	1110	94.1	F
60	1160	404T	M4403T	†*	4901	B2	1652M	1007	91.7	F
75	3525	365TS	EM4313T	†*	5878	D2	1472M	827	94.1	F
75	3525	365TS	M4313T	†*	5157	B2	1448M	804	91.0	F
75	1760	365T	EM4316T	†*	5260	B2	1480M	865	95.0	F
75	1760	365T	M4316T	†*	4374	L2	1452M	858	92.4	F
75	1760	444U	M4316	†* d	6588	D2	1852M	1315	91.0	E
75	1160	405T	EM4404T	†*	8308	D2	1684M	1164	94.1	F
75	1160	405T	M4404T	†*	5801	B2	1662M	1085	92.4	F
100	3525	405TS	EM4402T-4	†*	7591	D2	1668M	1076	94.5	G
100	3525	405TS	M4402T-4	†*	6347	B2	1672M	1111	93.0	G
100	1760	405T	EM4400T-4	†*	7180	B2	1680M	1153	95.0	G
100	1760	405T	M4400T	†	5825	L2	1658M	1049	93.0	F
100	1160	444T	EM4409T	†*	10850	D2	1880M	1535	94.5	F
100	1160	444T	M4409T	†*	7282	B2	1868M	1428	93.6	F
125	3525	444TS	EM4412T-4	†*	9965	D2	1870M	1427	94.1	G
125	3525	444TS	M4412T-4	†*	9001	B2	1860M	1750	93.6	G
125	1780	444T	EM4410T-4	†*	9135	B2	1880M	1519	95.0	G
125	1760	444T	M4410T-4	†*	7860	L2	1860M	1529	93.6	G
125	1160	445T	EM4411T-4		12630	D2	1892M	1648	94.5	G
125	1160	445T	M4411T-4	†*	9988	B2	1884M	1724	94.1	G
150	3525	445TS	EM4413T-4	†*	12177	D2	1890M	1750	94.1	G
150	3525	445TS	M4413T-4	†*	10963	B2	1872M	1800	94.1	G
150	3525	445TS	ECP4413T-4		14100	B2	1890M	1698	94.1	G
150	1760	445T	EM4406T-4	†*	11417	B2	1890M	1647	95.0	G
150	1760	445T	M4406T-4	†*	9383	L2	1872M	1705	93.6	G
150	1760	445T	ECP4406T-4		13129	B2	1890M	1624	95.0	G
150	1160	447T	EM44156T-4		14775	D2	18112M			G
150	1160	447T	M44156T-4		11398	B2	1800M			G
150	1160	447T	ECP44156T-4		15155	D2	1800M		(94.5)	G
200	3525	447TS	EM4416T-4		14947	D2	1800M	1850		G
200	3525	447TS	M4416T-4		12610	B2	1800M	1850		G
200	3525	447TS	ECP4416T-4		16770	D2	1800M	1850	(95.8)	G
200	1760	447T	EM4407T-4		12900	B2	18120M	2003	(96.2)	G
200	1760	447T	M4407T-4	†*	11318	L2	1892M	1753	94.1	G
200	1760	447T	ECP4407T-4		14680	D2	1800M	2003	95.0	G
200	1160	449T	EM44206T-4		15510	D2	18140M			G
200	1160	449T	M44206T-4		13633	B2	1800M			G
200	1160	449T	ECP44206T-4		17600	D2	1800M		(95.8)	G
250	1760	447TS	EM4408T-4		15780	B2	1800M			G
250	1760	447TS	M4408T-4	†	14491	L2	18120M	2003	94.5	G
250	1800	449T	ECP4408T-4		18240	D2	1800M		(96.2)	G
250	1800	5007L	ECP50254L-2341		31405	D2	N5007M		(95.2)	O
250	1200	449T	ECP44256T-4		22340	D2	1800M		(95.8)	G
250	1200	5009L	ECP50256L-2341		41277	D2	N5009M		(94.5)	O
300	1800	449T	ECP44304T-4		24895	D2	1800M		(96.2)	G
300	1800	5009L	ECP50304L-2341		37660	D2	N5007M		(95.4)	O
300	1200	449T	ECP44306T-4		28510	D2	1800M		(95.8)	G
300	1200	5011L	ECP50306L-2341		44894	D2	N5011M		(95.1)	O
350	1800	5011L	ECP50354L-2341		40426	D2	N5011M		(95.4)	O
350	1200	5011L	ECP50356L-2341		48510	D2	N5011M		(95.1)	O
400	1800	449T	ECP44404T-4		35106	D2	1800M		(96.2)	G
400	1800	5011L	ECP50404L-2341		43190	D2	N5011M		(95.6)	O
400	1200	5011L	ECP50406L-2341		51702	D2	N5011M		(95.5)	O
450	1800	5011L	ECP50454L-2341		45957	D2	N5011M		(95.5)	O
450	1200	5011L	ECP50456L-2341		55745	D2	N5011M		(95.0)	O
500	1800	5011L	ECP50504L-2341		48723	D2	N5011M		(95.5)	O
500	1200	5011L	ECP50506L-2341		59362	D2	N5011M		(95.0)	O

CATALOG NO.'S ENDING IN -4 ARE 460 VOLT, 3 LEAD MOTORS

SHADED RATINGS ARE CAST IRON FRAMES.

NOTE: CAT M3711T SUITABLE FOR 208-230/460 WITH 1.0 S.F. ( ) = NOMINAL EXPECTED VALUES.
VOLTAGE @ 60 HZ: E = 208-230/460, F = 230/460, G = 460, O = 2300/4160 VOLTS. d = TO BE DISCONTINUED WHEN PRESENT STOCK IS DEPLETED.

GT-30

PERFORMANCE DATA (Standard Efficiency

Totally-Enclosed Fan-Cooled 3/60/230-460V (usable on 208V); 575V NEMA Design B and C, Class F Insulation, 40°C ambient, Continuous Duty, 1.15 S.F.

HP	FULL LOAD RPM	FRAME SIZE	LIST PRICE	FULL LOAD TORQUE LB-FT	FULL LOAD EFF. %	FULL LOAD P.F. %	FULL LOAD CURRENT AMPS @460V	LOCKED ROTOR TORQUE %FLT	LOCKED ROTOR CURRENT AMPS @460V	BREAK-DOWN TORQUE %FLT	ROTOR WR^2 LB-FT²	NEMA CODE LETTER	APPROX. NET WT. LBS.
¾	1150	143T	$172	3.4	74.0	61.5	1.5	175	13	275	0.060	P	46
1	1750	143T	144	3.1	77.0	76.0	1.7	275	15	300	0.063	N	44
	1160	145T	180	4.6	75.5	60.5	1.9	170	15	265	0.105	N	50
1½	3470	143T	148	2.3	80.0	86.0	2.2	175	20	250	0.050	M	44
	1720	145T	160	4.6	77.0	78.5	2.3	250	20	280	0.085	M	47
	1150	182T	192	6.9	75.5	77.5	2.6	165	20	250	0.200	M	78
2	3460	145T	172	3.1	81.5	87.5	2.8	170	25	240	0.065	L	46
	1715	145T	176	6.1	80.0	81.5	3.0	235	25	270	0.105	L	50
	1160	184T	212	9.2	80.0	74.5	3.3	160	25	240	0.300	L	88
3	3410	182T	202	4.6	78.5	90.5	4.1	160	32	230	0.125	K	73
	1750	182T	196	9.1	84.0	79.5	4.2	215	32	250	0.220	K	77
	1170	213T	266	13.5	85.5	74.5	4.7	155	32	230	0.360	K	117
5	3460	184T	250	7.6	82.5	93.0	6.5	150	46	215	0.235	J	90
	1735	184T	228	15.1	85.5	86.5	6.6	185	46	225	0.395	J	103
	1155	215T	390	22.7	84.0	78.5	7.3	150	46	215	0.925	J	160
7½	3475	213T	310	11.4	84.0	89.5	9.5	140	64	200	0.280	H	143
	1745	213T	310	22.6	86.5	89.5	9.7	175	64	215	0.695	H	143
	1170	254T	528	34.1	86.5	85.0	10.4	150	64	205	1.710	H	211
10	3465	215T	362	15.3	85.5	90.5	12.4	135	81	200	0.380	H	172
	1745	215T	374	30.3	87.5	90.5	12.6	165	81	200	0.955	H	172
	1170	256T	652	45.3	87.5	84.5	13.5	150	81	200	2.550	H	253
15	3510	254T	510	22.6	86.5	91.5	18.3	130	116	200	0.990	G	246
	1750	254T	500	45.3	88.5	90.5	18.5	160	145	200	1.950	G	255
	1165	284T	886	68.0	88.5	82.5	19.6	140	116	200	4.100	G	323
20	3515	256T	650	30.0	88.5	91.5	24.0	130	145	200	1.300	G	297
	1750	256T	628	60.0	90.2	90.5	24.3	150	145	200	2.450	G	308
	1170	286T	1114	90.0	90.2	85.5	25.5	135	145	200	7.550	G	440
25	3505	284TS	800	36.0	88.5	91.0	29.7	130	183	200	1.600	G	385
	1750	284T	782	75.0	90.2	88.5	30.2	150	183	200	3.750	G	396
	1170	324T	1332	112.0	91.7	82.5	31.3	135	183	200	8.700	G	583
30	3520	286TS	946	45.0	88.5	91.0	35.0	130	218	200	2.100	G	433
	1755	286T	896	90.0	90.2	90.0	36.0	150	218	200	4.600	G	451
	1170	326T	1540	135.0	91.0	85.5	36.5	135	218	200	11.600	G	435
40	3550	324TS	1245	61.0	89.5	89.0	47.0	125	290	200	3.000	G	583
	1760	324T	1196	120.0	91.0	90.0	47.5	140	290	200	6.700	G	638
	1180	364T	2080	180.0	92.4	85.0	49.5	135	290	200	15.600	G	781
50	3545	326TS	1662	76.0	89.5	92.0	58.5	120	363	200	3.460	G	638
	1760	326T	1524	149.0	91.7	90.5	58.5	140	363	200	7.590	G	704
	1175	365T	2428	224.0	91.7	86.5	61.5	135	363	200	17.940	G	832
	875	405T	3710	300.0	92.4	80.0	63.0	200	363	250	24.500	G	1034
60	3525	364TS	2346	89.0	89.0	94.0	69.0	120	435	200	5.450	G	766
	1765	364T	2348	179.0	93.0	87.5	71.0	140	435	200	10.800	G	781
	1170	404T	2806	269.0	93.0	84.0	72.0	200	435	250	23.100	G	1056
	875	405T	4302	360.0	92.4	80.0	76.0	200	435	250	30.000	G	1210
75	3540	365TS	3026	111.0	91.0	93.0	86.0	105	543	200	8.050	G	836
	1770	365T	2982	224.0	94.1	86.5	88.0	140	543	200	14.700	G	847
	1170	405T	3372	336.0	93.0	84.0	90.0	200	543	250	28.900	G	1254
	880	444T	5724	447.0	93.0	81.5	93.0	200	543	250	49.200	G	1540
100	3550	405TS	4082	148.0	93.0	89.5	112.0	105	725	200	10.900	G	1168
	1770	405T	3746	296.0	93.0	87.5	115.0	200	725	250	25.000	G	1309
	1175	444T	4746	447.0	93.0	85.5	118.0	200	725	250	50.700	G	1584
	880	445T	7240	596.0	93.0	82.5	122.0	200	725	250	64.000	G	1782
125	3555	444TS	5162	185.0	93.0	90.2	140.0	100	908	200	16.000	G	1430
	1775	444T	4836	370.0	93.6	87.5	115.0	200	908	250	37.900	G	1540
	1175	445T	6082	558.0	93.6	85.5	146.0	200	908	250	62.000	G	1782
	885	447TZ	8176	741.0	93.6	82.5	152.0	200	908	250	86.400	G	2244
150	3555	445TS	6242	221.0	93.0	90.2	167.0	100	1085	200	19.000	G	1584
	1775	445T	5504	443.0	93.6	87.5	171.0	200	1085	250	45.500	G	2156
	1180	447TZ	7102	667.0	93.6	85.5	176.0	200	1085	250	45.500	G	1694
	885	449TZ	9834	889.0	93.6	82.5	182.0	200	1085	250	99.400	G	2530
200	3580	447TS	8782	294.0	93.6	90.2	222.0	100	1450	200	29.800	G	2112
	1785	447TZ	7358	590.0	94.1	88.5	225.0	200	1450	250	61.800	G	2134
	1180	449TZ	9646	889.0	94.1	85.5	233.0	200	1450	250	96.000	G	2508
	885	5007C	12848	118.8	94.1	84.0	237.0	120	1450	200	282.000	G	3100
250	3580	449TS	11410	368.0	93.6	90.2	277.0	70	1825	175	35.800	G	2486
	1785	449TZ	9444	737.0	94.1	88.5	281.0	200	1825	250	73.400	G	2464
	1180	5007C	12028	1113.0	95.0	86.5	285.0	200	1825	250	209.000	G	2900
	885	5009C	14845	1485.0	94.5	84.0	295.0	110	1825	200	353.000	G	3500
300	3580	5007A	19240	440.0	94.5	91.0	327.0	85	2200	210	55.000	G	2750
	1785	5007C	11158	883.0	95.0	89.5	331.0	200	2200	250	129.000	G	2900
	1185	5009C	17600	1336.0	95.0	86.5	342.0	200	2200	250	237.000	G	2900
	885	5806B	19484	1782.0	94.5	84.0	353.0	100	2200	200	502.000	G	4400
350	3580	5009A	15922	514.0	94.5	91.0	381.0	85	2550	210	66.000	G	3400
	1785	5009C	13268	1030.0	95.0	90.2	382.0	200	2550	250	154.000	G	2560
	1185	5806B	19712	1558.0	95.0	87.5	394.0	200	2550	250	420.000	G	3560
	885	5808B	21338	2078.0	94.5	84.0	413.0	100	2550	200	585.000	G	5100
400	3580	5808A	20288	587.0	94.5	91.7	432.0	80	2900	200	120.000	G	4900
	1785	5806B	14860	1177.0	95.0	90.2	437.0	200	2900	250	270.000	G	4200
	1185	5808B	21064	1782.0	95.0	87.5	451.0	200	2900	250	495.000	G	5100
450	1785	5808B	18500	1325.0	95.0	90.2	491.0	200	3250	250	300.000	G	5100
500	1785	5808B	20900	1472.0	95.0	91.0	541.0	200	3625	250	335.000	G	5100

Note:

1. The above are typical values based on test
2. Breakdown & locked rotor torque are shown as NEMA minimum value
3. Actual load & full voltage starting: According to ANSI / IEEE standard 112-1978 method B
4. 150HP and larger are 460V or 575V only.
5. Data subject to change without notice.

Performance Data MAX-E1™ Premium Efficiency, Type AEHE

Totally-Enclosed Fan-Cooled, 3/60/230-460V (usable on 208V); 575V
NEMA Design B or Design C, Class F Insulation, 40°C ambient, Continuous Duty, 1.15 S.F.

HP	Full Load RPM	Frame Size	Full Load Torque (LB-FT)	Full Load Nom. Eff. %	Full Load Min. Eff. %	Full Load P.F. %	Full Load Current Amps @460V	Locked Rotor Torque %	Locked Rotor Current Amps @460V	Breakdown Torque %	Rotor WK^2	NEMA Code Letter	Approx. Weight
0.75	1150	143T	3.4	82.5	80.0	61.0	1.4	175	12.5	275	0.105	P	[illegible]
1	1745	143T	3.0	86.5	84.1	77.0	1.4	275	15.0	300	0.105	N	[illegible]
	1150	145T	4.6	85.5	82.7	60.0	1.8	170	15.0	265	0.124	N	59
1.5	3480	143T	2.3	85.5	83.0	82.5	2.0	175	20.0	250	0.042	M	53
	1730	145T	4.6	86.5	85.0	80.0	2.0	250	20.0	280	0.120	M	57
	1160	182T	6.8	86.5	85.4	68.0	2.4	165	20.0	250	0.317	M	90
2	3480	145T	3.0	86.5	84.0	84.0	2.6	170	25.0	240	0.051	L	57
	1730	145T	6.1	86.5	85.3	80.0	2.7	235	25.0	270	0.139	L	62
	1165	184T	9.0	87.5	85.9	66.0	3.2	160	25.0	240	0.392	L	101
3	3520	182T	4.5	86.5	85.3	83.0	3.9	160	32.0	230	0.196	K	90
	1750	182T	9.0	88.5	87.0	83.0	3.8	215	32.0	250	0.355	K	95
	1165	213T	13.5	88.5	87.0	73.0	4.3	155	32.0	230	0.755	K	139
5	3520	184T	7.5	89.5	87.7	86.0	6.1	150	46.0	215	0.281	J	106
	1750	184T	15.0	89.5	88.1	83.0	6.1	185	46.0	225	0.504	J	114
	1165	215T	22.5	89.5	87.5	73.0	7.1	150	46.0	215	1.073	J	165
7.5	3525	213T	11.2	91.0	89.8	86.5	8.9	140	63.5	200	0.462	H	156
	1755	213T	22.5	91.7	90.3	81.0	9.4	175	63.5	215	0.863	H	167
	1170	254T	33.7	91.7	90.4	77.0	9.9	150	63.5	205	2.192	H	257
10	3525	215T	14.9	91.0	89.7	88.0	11.7	135	81.0	200	0.592	H	183
	1755	215T	29.9	91.7	90.4	82.0	12.4	165	81.0	200	1.140	H	189
	1170	256T	44.9	91.7	90.4	77.5	13.1	150	81.0	200	2.698	H	295
15	3540	254T	22.3	91.7	91.0	87.0	17.8	130	116.0	200	1.762	G	282
	1760	254T	44.8	92.4	91.6	83.0	18.3	160	116.0	200	2.222	G	288
	1175	284T	67.1	91.7	90.9	80.5	19.0	140	116.0	200	6.343	G	414
20	3540	256T	29.7	91.7	90.8	87.0	23.4	130	145.0	200	2.115	G	316
	1765	256T	59.5	93.0	92.0	83.0	24.2	150	145.0	200	2.794	G	332
	1175	286T	89.4	92.4	91.6	80.5	25.2	135	145.0	200	8.073	G	473
25	3545	284TS	37.1	93.0	92.1	91.0	27.6	130	182.5	200	2.595	G	418
	1765	284T	74.4	93.0	92.4	86.0	29.7	150	182.5	200	4.507	G	428
	1175	324T	112.0	93.0	92.4	82.0	30.7	135	182.5	200	10.546	G	623
30	3545	286TS	44.5	93.0	92.2	91.5	33.0	130	217.5	200	2.930	G	465
	1765	286T	89.3	93.6	92.7	85.0	35.3	150	217.5	200	5.138	G	476
	1175	326T	134.0	93.6	92.5	83.0	36.1	135	217.5	200	12.554	G	697
40	3540	324TS	59.4	94.1	93.1	91.5	43.5	125	290.0	200	3.528	G	818
	1770	324T	119.0	94.1	93.2	85.0	46.8	200	290.0	200	8.795	G	864
	1175	364T	179.0	94.1	93.1	82.0	48.5	200	290.0	200	18.234	G	898
50	3540	326TS	74.0	94.1	93.0	91.5	54.5	120	362.5	200	4.270	G	693
	1770	326T	148.0	94.1	93.2	86.0	58.0	200	362.5	200	10.325	G	724
	1175	365T	224.0	94.1	93.1	83.0	60.0	200	362.5	200	21.740	G	911
60	3535	364TS	89.0	94.1	93.0	90.0	62.5	120	435.0	200	5.094	G	818
	1775	364T	178.0	94.5	93.8	86.0	69.0	200	435.0	200	12.019	G	858
	1176	404T	268.0	93.5	92.3	82.3	73.0	200	435.0	220	33.300	G	1164
75	3540	365TS	111.0	94.1	93.5	90.0	83.0	105	542.5	200	6.020	G	880
	1770	365T	223.0	94.5	93.9	87.0	85.5	200	542.5	200	15.024	G	928
	1177	405T	335.0	93.7	92.5	82.4	91.0	200	545.0	220	42.400	G	1340
100	3560	405TS	148.0	94.1	93.0	88.0	113.0	110	725.0	220	13.800	G	1320
	1775	405T	296.0	94.6	93.7	86.1	115.0	200	725.0	220	33.200	G	1430
	1180	444T	445.0	94.8	93.8	84.4	117.0	200	725.0	220	54.800	G	1670
125	3564	444TS	184.0	94.9	93.9	89.4	138.0	105	910.0	220	16.100	G	1630
	1778	444T	369.0	94.7	93.9	87.6	141.0	200	910.0	220	42.200	G	1660
	1180	445T	557.0	94.9	93.9	85.8	144.0	200	910.0	220	70.700	G	1910
150	3568	445TS	221.0	95.0	94.1	90.1	164.0	105	1085.0	210	21.200	G	1660
	1780	445T	443.0	94.7	93.9	88.3	168.0	200	1085.0	210	49.700	G	1820
	1182	447TZ	667.0	95.0	94.1	86.4	171.0	200	1085.0	210	107.00	G	2315
200	3580	447TS	294.0	95.4	94.5	91.3	215.0	100	1450.0	210	34.300	G	2220
	1785	447TZ	589.0	95.5	94.6	88.7	221.0	200	1450.0	210	74.000	G	2380
	1185	449TZ	887.0	95.1	94.2	84.5	233.0	200	1450.0	210	129.000	G	2685
250	3583	449TS	367.0	95.4	94.5	91.2	269.0	100	1825.0	210	43.100	G	2620
	1786	449TZ	736.0	95.5	94.6	89.1	275.0	200	1825.0	210	87.700	G	2720

Note:
1. The above are typical values based on test.
2. Actual load and full voltage starting: According to ANSI/IEEE standard 112-1978 method B.
3. Minimum guaranteed efficiency values can be certified with actual tests.
4. Breakdown and locked rotor torque are shown as NEMA minimum values.
5. 150 HP and above are 460V only.
6. Data subject to change without notice.

HP	PREMIUM EFFICIENCY MOTOR EFFICIENCY						STANDARD EFFICIENCY MOTOR EFFICIENCY					PREMIUM EFFICIENCY MOTOR COSTS					HANDLE	INSTALL	BASE (5) LABOR	TOTAL COST (6)
	COE	(1)	(2)	(3)	(4)	AVG 1,3&4	(1)	(2)	(3)	(4)	AVG 1,3&4	(1)	(2)	(3)	(4)	AVG 1,3&4	(hrs)	(hrs)	($)	($)
1.0	85.5%	86.5%	78.5%	86.5%	85.5%	86.2%	78.5%	78.5%	77.0%	77.0%	77.5%	$319	$289	$362	$395	$359	2.00	1.78	$94	$795
1.5	85.5%	86.5%	81.5%	86.5%	85.5%	86.2%	77.0%	81.5%	77.0%	78.5%	77.5%	$354	$302	$402	$410	$389	2.50	1.78	$107	$869
2.0	85.5%	86.5%	81.5%	86.5%	86.5%	86.5%	80.0%	81.5%	80.0%	82.5%	80.8%	$387	$323	$442	$430	$420	2.67	1.78	$111	$931
3.0	88.5%	88.5%	85.5%	88.5%	89.5%	88.8%	84.0%	85.5%	84.0%	81.5%	83.2%	$429	$383	$490	$451	$457	3.50	1.78	$132	$1,032
5.0	88.5%	89.5%	85.5%	89.5%	90.2%	89.7%	86.0%	85.5%	85.5%	84.0%	85.2%	$502	$453	$678	$478	$553	4.20	1.78	$149	$1,231
7.5	90.0%	91.7%	87.5%	91.7%	91.0%	91.5%	87.0%	86.5%	86.5%	85.5%	86.3%	$685	$919	$776	$651	$704	5.33	1.91	$181	$1,552
10	90.0%	91.7%	89.5%	91.7%	91.7%	91.7%	87.5%	87.5%	87.5%	87.5%	87.5%	$825	$1,078	$815	$732	$791	6.67	2.00	$216	$1,767
15	91.0%	92.4%	91.0%	92.4%	92.4%	92.4%	89.0%	88.5%	88.5%	87.5%	88.3%	$1,088	$1,350	$1,232	$1,045	$1,122	8.00	2.50	$262	$2,428
20	92.0%	93.0%	91.7%	93.0%	93.0%	93.0%	89.5%	87.5%	90.2%	88.5%	89.4%	$1,368	$1,682	$1,535	$1,266	$1,390	10.67	3.08	$343	$3,040
25	92.0%	93.0%	93.0%	93.0%	94.1%	93.4%	90.2%	90.2%	90.2%	89.5%	90.0%	$1,610	$2,000	$1,828	$1,658	$1,699	11.40	3.20	$364	$3,619
30	92.0%	93.6%	93.0%	93.6%	94.1%	93.8%	90.6%	91.0%	90.2%	90.2%	90.3%	$1,874	$2,325	$2,125	$1,969	$1,989	13.30	3.33	$415	$4,218
40	92.0%	94.1%	93.6%	94.1%	94.5%	94.2%	91.0%	91.7%	91.0%	91.0%	91.0%	$2,486	$3,105	$2,823	$2,574	$2,628	16.00	4.00	$499	$5,486
50	92.5%	94.1%	94.1%	94.1%	95.0%	94.4%	92.0%	91.7%	91.7%	91.7%	91.8%	$3,053	$3,812	$3,467	$2,900	$3,140	17.78	5.00	$568	$6,506
60	92.5%	94.5%	94.1%	94.5%	95.0%	94.7%	92.4%	91.0%	93.0%	92.4%	92.6%	$4,374	$5,472	$4,974	$4,501	$4,616	19.00	5.71	$617	$9,181
75	92.5%	94.5%	94.5%	94.5%	95.0%	94.7%	93.6%	93.0%	94.1%	92.4%	93.4%	$5,548	$6,936	$6,305	$5,260	$5,704	20.00	6.67	$665	$11,176
100	93.5%	94.6%	95.0%	94.6%	95.0%	94.7%	93.0%	91.7%	93.0%	93.0%	93.0%	$6,860	$8,572	$7,790	$7,180	$7,277	24.00	8.89	$821	$14,207

Totally enclosed, fan cooled, squirrel cage
(1) Westinghouse Optim HE
(2) Magnetek Louis Allis Spartan
(3) TECO Max-E1
(4) Baldor Super-E

(5) Labor cost for electrician from Means Electrical Cost Data 1993 is $24.95/hr.
(6) Includes 10% site & location factor, 16% overhead, 10% profit, and 25% contingency.

Energy Type	Unit Energy Cost	UPW Discount Factors (1) Discount rate = 4%, Region 3		
Economic Life of ECO (yrs)		10	15	20
Electric Energy	0.024402 ($/kWh)	8.39	11.77	14.65
Electric Demand	152.67 ($/kW)	8.39	11.77	14.65
Natural Gas	4.035 ($/MBtu)	10.01	15.34	20.6
Central Plant Hot Water	5.38 ($/MBtu)	10.01	15.34	20.6
Central Plant Chilled Water	4.067 ($/MBtu)	8.39	11.77	14.65
Annual Recurring Non-Energy Savings		8.11	11.12	13.59

(1) NISTIR 85-3273-7 EDnergy Prices and Discount Factors for Life-Cycle Cost Analysis 1993

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MOTOR SURVEY

BLDG. No.	MOTOR APPLICATION	HP	MANUFACTURER	VOLTS	AMPS	CONTROL SET PTS HIGH (°F)	LOW (°F)	HRS/YEAR
P-1950	Secondary CW/HW Pump	3.0	Westinghouse	208-230/460	9.2/4.6	70	65	8029
P-2070	"	2.0	ESTIMATED - NO NAME PLATE	—	—	65	50	6475
P-2153	"	3.0	Leland-Faraday	208-220/440	9.0-8.8/4.4	65	55	7206
P-2250	"	3.0	Baldor	208-220/440	8.4-8.0/4.0	70	70	8760
P-1951	"	5.0	Marathon (Federal pump - 112.8 gpm at 31 ft.H)	208-220/440	13.0/6.5	65	60	7947
P-1952	"	5.0	Marathon	208-230/460	14.8-15.4/7.7	70	65	8029
P-1953	"	1.5	Marathon	208-220/440	4.8/2.4	70	65	8029
P-1954	"	(Est.) 5.0	Marathon	208-220/440	13.0/6.5	65	55	7206
P-2050	"	5.0	Marathon	"		70	62	8029
P-2051	"	5.0	Marathon	"	"	65	55	7206
P-2052	"	1.5	Baldor	208-230/440	5.2-4.8/2.4	70	65	8029
P-2054	"	Motor is in repair shop - HVAC No. 21P/21F				70	60	7216
P-2071	"	2.0	Marathon	208-220/440	6.4/3.2	65	60	7947
P-2072	"	5.0	Marathon	208-220/440	13.0/6.5	65	55	7206
P-2073	"	5.0	Marathon	"	"	45	45	8760
P-2074	"	1.5	Baldor	208-230/460	5.2-4.8/2.4	~~68~~ 70	50	5744

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MOTOR SURVEY

BLDG. No.	MOTOR APPLICATION	HP	MANUFACTURER	VOLTS	AMPS	CONTROL SETPTS HIGH (°F)	LOW (°F)	HRS/YEAR
P-2150	Secondary CW/HW Pump	5.0	ESTIMATED - NO NAMEPLATE	—	—	75	60	6696
P-2151	"	5.0	Baldor	208-230/460	13.1-11.5/5.7	65	65	8760
P-2152	"	5.0	Marathon	208-230/460	14.0-14.0/7.0	65	60	7947
P-2154	"	5.0	Baldor High Efficiency	208-230/460	13.1-11.5/5.7	65	55	7206
P-2251	"	5.0	Baldor	"	"	75	65	7509
P-2252	"	5.0	Marathon	208-230/440	13.0/6.5	80	60	6284
P-2253	"	5.0	Marathon	"	"	Control is disabled.		8760
P-2254	"	5.0	U.S. Electric	230/460	12.8/6.4	65	65	8760
P-2450	"	5.0	Reliance	200	16.1			8240
P-2451	"	5.0	Reliance	200	16.1			"
P-2452	"	3.0	General Electric	230/460	9.2/4.6			"
P-2453	"	5.0	Reliance	200	16.1			"
P-2454	"	5.0	Reliance	200	16.1			"
P-2350	AHU	10.0	Century 6-330779-02	200/208	29.0/29.0	—		8760
	HW Pump	1.0	Century H258	208-230/460	3.4-3.4/1.7			6577
	CW Pump	1.5	Wagner	220/440	4.8/2.4			2183

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MOTOR SURVEY

BLDG. No.	MOTOR APPLICATION	HP	MANUFACTURER	VOLTS	AMPS	CONTROL SET PTS. HIGH (°F) LOW (°F)	HRS/YEAR
P-1853	AHU-1	10.0	Marathon	200	31.0	—	8760
	AHU-2	5.0	U.S. Electric	200	16.6		NOT USED
	HW Pump HW pump #2	5.0 0.5	Marathon	208-220/440	13.0/6.5		6577 NOT USED
	CW Pump	1.0	Baldor High Efficiency	208-230/460	3.6-3.4/1.7		2183
P-2060	AHU-1	7.5	Century	200-208	23.0-23.0		8760
	AHU-2	5.0	Century	200-208	16.0-16.0		NOT USED
	HW pump HW pump #2	5.0 0.33	Marathon (Dayton)	208-220/440	13.0/6.5		6577 NOT USED
	CW pump	1.5	Marathon	208-220/440	4.8/2.4		2183
P-2160	AHU-1	7.5	Century	200-208	23.0-23.0		8760
	AHU-2	3.0	AJAX Elect.	230/460	9.0/4.5		NOT Used
	HW pump	1.5	Baldor	208-220/440	4.6-4.2/2.1		6577
	HW pump #2	1.0	Bell & Gosset	230/460	4.6/2.3		NOT USED
	CW pump	1.5	Marathon	208-220/440	4.8/2.4		2183
P-2352	AHU	10.0	Century	200-208	29.0-29.0		8760
	HW Pump	0.75	Baldor	208-230/460	3.2-3.0/1.5		6577
	CW Pump	1.5	Wagner	208-220/440	4.8-4.8/2.4		2183
P-2700	AHU	10.0	U.S. Elec. Motor	230/460	27.4/13.7		8760
	R.A. Fan	3.0	Century-Gould	200-208	10.4-10.4		8760
	HW Pump #1	3.0	U.S. Elec. Motor	200	10.0		6577
	HW Pump #2 (stand by)	3.0	"	"	"		—
	CW Pump	3.0	"	200	10.0		2183

TAB C-2

FORT CARSON NIGHT SETBACK THERMOSTAT
ECO #14

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION:	FORT CARSON, COLORADO	REGION:	4	PROJECT NO:	
PROJECT TITLE:	FT CARSON EEAP UPDATE			FISCAL YEAR:	1992
DISCRETE PORTION NAME:	ECO #14 - NIGHT SETBACK THERMOSTAT			BUILDING NO.:	P-1007
ANALYSIS DATE:	04/14/93	ECONOMIC LIFE:	15	PREPARED BY:	A. NIEMEYER

1 INVESTMENT COSTS

A. CONSTRUCTION COST	=		$1,005	
B. SIOH COST	(5.5% of 1A) =		$55	
C. DESIGN COST	(6.0% of 1A) =		$60	
D. TOTAL COST	(1A + 1B + 1C) =		$1,120	
E. SALVAGE VALUE	=		$0	
F. SALVAGE VALUE OF EXISTING EQUIP.	=		$0	
G. TOTAL INVESTMENT	(1D - 1E - 1F) =		---------->	$1,120

2 ENERGY SAVINGS (+) or COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS: OCTOBER 1992

ENERGY SOURCE	COST $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A. ELEC & DEMAND	$17.14	22.00	$377	11.70	$4,412	
B. DIST			$0	13.78	$0	
C. NAT GAS	$3.48	331.00	$1,151	14.16	$16,292	
D. COAL			$0	11.57	$0	
E. SOLAR			$0		$0	
F. DEMAND SAVINGS	$69.68 / year		$0	11.12	$0	
G. TOTAL		353.00	$1,528		---------->	$20,704

3 NONENERGY SAVINGS (+) or COST (-)

A. ANNUAL RECURRING			$0	
1 DISCOUNT FACTOR	(From Table A-2) =	11.12		
2 DISCOUNTED SAVINGS or COST	(3A x 3A1) =		$0	

B. NONRECURRING

ITEM	SAVINGS or COST (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3)	DISCOUNTED SVGS or COST (4)
a.	$0	0	0.00	$0
b.	$0	0	0.00	$0
c.	$0	0	0.00	$0
d TOTAL	$0			$0

C. TOTAL NONENERGY DISCOUNTED SAVINGS or COST (3A2 + 3Bd4) = $0

4 SIMPLE PAYBACK (SPB) - (YRS)	1G/(2G3 + 3A + (3Bd1/15)) =	0.7
5 TOTAL NET DISCOUNTED SAVINGS	(2G5 + 3C) =	$20,704
6 SAVINGS-TO-INVESTMENT RATIO (SIR)	(5/1G) =	18.48
7 ADJUSTED INTERNAL RATE OF RETURN (AIRR) - (%)	[(1+.04) x SIR to 1/15 power - 1] x 100 =	26.32

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION: FORT CARSON, COLORADO REGION: 4 PROJECT NO:
PROJECT TITLE: FT CARSON EEAP UPDATE FISCAL YEAR: 1992
DISCRETE PORTION NAME: ECO #14 - NIGHT SETBACK THERMOSTAT BUILDING NO.: P-1955
ANALYSIS DATE: 04/14/93 ECONOMIC LIFE: 15 PREPARED BY: A. NIEMEYER

1 INVESTMENT COSTS

A.	CONSTRUCTION COST	=	$335	
B.	SIOH COST	(5.5% of 1A) =	$18	
C.	DESIGN COST	(6.0% of 1A) =	$20	
D.	TOTAL COST	(1A + 1B + 1C) =	$373	
E.	SALVAGE VALUE	=	$0	
F.	SALVAGE VALUE OF EXISTING EQUIP.	=	$0	
G.	TOTAL INVESTMENT	(1D - 1E - 1F) =	---------->	$373

2 ENERGY SAVINGS (+) or COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS: OCTOBER 1992

	ENERGY SOURCE	COST $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A.	ELEC	$7.32		$0	11.70	$0	
B.	DIST		0	$0	13.78	$0	
C.	NAT GAS	$3.48	160	$557	14.16	$7,884	
D.	COAL		0	$0	11.57	$0	
E.	SOLAR			$0		$0	
F.	DEMAND SAVINGS	$69.68 / year		$0	11.12	$0	
G.	TOTAL		160	$557		---------->	$7,884

3 NONENERGY SAVINGS (+) or COST (-)

A. ANNUAL RECURRING			$0	
1 DISCOUNT FACTOR	(From Table A-2) =	11.12		
2 DISCOUNTED SAVINGS or COST	(3A x 3A1) =		$0	

B. NONRECURRING

ITEM	SAVINGS or COST (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3)	DISCOUNTED SVGS or COST (4)
a.	$0	0	0.00	$0
b.	$0	0	0.00	$0
c.	$0	0	0.00	$0
d TOTAL	$0			$0

C. TOTAL NONENERGY DISCOUNTED SAVINGS or COST (3A2 + 3Bd4) = $0

4 SIMPLE PAYBACK (SPB) - (YRS)	1G/(2G3 + 3A + (3Bd1/15)) =	0.7
5 TOTAL NET DISCOUNTED SAVINGS	(2G5 + 3C) =	$7,884
6 SAVINGS-TO-INVESTMENT RATIO (SIR)	(5/1G) =	21.12
7 ADJUSTED INTERNAL RATE OF RETURN (AIRR) - (%)	[(1+.04) x SIR to 1/15 power - 1] x 100 =	27.45

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION: FORT CARSON, COLORADO	REGION: 4	PROJECT NO:	
PROJECT TITLE: FT CARSON EEAP UPDATE		FISCAL YEAR:	1992
DISCRETE PORTION NAME: ECO #14 - NIGHT SETBACK THERMOSTAT		BUILDING NO.:	P-1956
ANALYSIS DATE: 04/14/93	ECONOMIC LIFE: 15	PREPARED BY:	A. NIEMEYER

1 INVESTMENT COSTS

A.	CONSTRUCTION COST	=	$335	
B.	SIOH COST	(5.5% of 1A) =	$18	
C.	DESIGN COST	(6.0% of 1A) =	$20	
D.	TOTAL COST	(1A + 1B + 1C) =	$373	
E.	SALVAGE VALUE	=	$0	
F.	SALVAGE VALUE OF EXISTING EQUIP.	=	$0	
G.	TOTAL INVESTMENT	(1D - 1E - 1F) =	---------->	$373

2 ENERGY SAVINGS (+) or COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS: OCTOBER 1992

	ENERGY SOURCE	COST $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A.	ELEC	$7.32		$0	11.70	$0	
B.	DIST		0	$0	13.78	$0	
C.	NAT GAS	$3.48	160	$557	14.16	$7,884	
D.	COAL		0	$0	11.57	$0	
E.	SOLAR			$0		$0	
F.	DEMAND SAVINGS	$69.68 / year		$0	11.12	$0	
G.	TOTAL		160	$557		---------->	$7,884

3 NONENERGY SAVINGS (+) or COST (-)

A.	ANNUAL RECURRING			$0
	1 DISCOUNT FACTOR	(From Table A-2) =	11.12	
	2 DISCOUNTED SAVINGS or COST	(3A x 3A1) =		$0

B. NONRECURRING

ITEM	SAVINGS or COST (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3)	DISCOUNTED SVGS or COST (4)
a.	$0	0	0.00	$0
b.	$0	0	0.00	$0
c.	$0	0	0.00	$0
d TOTAL	$0			$0

C. TOTAL NONENERGY DISCOUNTED SAVINGS or COST (3A2 + 3Bd4) = $0

4 SIMPLE PAYBACK (SPB) - (YRS)	1G/(2G3 + 3A + (3Bd1/15)) =	0.7
5 TOTAL NET DISCOUNTED SAVINGS	(2G5 + 3C) =	$7,884
6 SAVINGS-TO-INVESTMENT RATIO (SIR)	(5/1G) =	21.12
7 ADJUSTED INTERNAL RATE OF RETURN (AIRR) - (%)	[(1+.04) x SIR to 1/15 power - 1] x 100 =	27.45

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION: FORT CARSON, COLORADO	REGION: 4	PROJECT NO:	
PROJECT TITLE: FT CARSON EEAP UPDATE		FISCAL YEAR:	1992
DISCRETE PORTION NAME: ECO #14 - NIGHT SETBACK THERMOSTAT		BUILDING NO.:	P-2055
ANALYSIS DATE: 04/14/93	ECONOMIC LIFE: 15	PREPARED BY:	A. NIEMEYER

1 INVESTMENT COSTS

A.	CONSTRUCTION COST	=	$335	
B.	SIOH COST	(5.5% of 1A) =	$18	
C.	DESIGN COST	(6.0% of 1A) =	$20	
D.	TOTAL COST	(1A + 1B + 1C) =	$373	
E.	SALVAGE VALUE	=	$0	
F.	SALVAGE VALUE OF EXISTING EQUIP.	=	$0	
G.	TOTAL INVESTMENT	(1D - 1E - 1F) =	--------->	$373

2 ENERGY SAVINGS (+) or COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS: OCTOBER 1992

	ENERGY SOURCE	COST $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A.	ELEC	$7.32		$0	11.70	$0	
B.	DIST		0	$0	13.78	$0	
C.	NAT GAS	$3.48	65	$228	14.16	$3,223	
D.	COAL		0	$0	11.57	$0	
E.	SOLAR			$0		$0	
F.	DEMAND SAVINGS	$69.68 / year		$0	11.12	$0	
G.	TOTAL		65	227.6		--------->	$3,223

3 NONENERGY SAVINGS (+) or COST (-)

A. ANNUAL RECURRING			$0	
1 DISCOUNT FACTOR	(From Table A-2) =	11.12		
2 DISCOUNTED SAVINGS or COST	(3A x 3A1) =		$0	

B. NONRECURRING

ITEM	SAVINGS or COST (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3)	DISCOUNTED SVGS or COST (4)
a.	$0	0	0.00	$0
b.	$0	0	0.00	$0
c.	$0	0	0.00	$0
d TOTAL	$0			$0

C. TOTAL NONENERGY DISCOUNTED SAVINGS or COST (3A2 + 3Bd4) = $0

4 SIMPLE PAYBACK (SPB) - (YRS)	1G/(2G3 + 3A + (3Bd1/15)) =	1.6
5 TOTAL NET DISCOUNTED SAVINGS	(2G5 + 3C) =	$3,223
6 SAVINGS-TO-INVESTMENT RATIO (SIR)	(5/1G) =	8.63
7 ADJUSTED INTERNAL RATE OF RETURN (AIRR) - (%)	[(1+.04) x SIR to 1/15 power - 1] x 100 =	20.07

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION: FORT CARSON, COLORADO   REGION: 4   PROJECT NO:
PROJECT TITLE: FT CARSON EEAP UPDATE   FISCAL YEAR: 1992
DISCRETE PORTION NAME: ECO #14 - NIGHT SETBACK THERMOSTAT   BUILDING NO.: P-2056
ANALYSIS DATE: 04/14/93   ECONOMIC LIFE: 15   PREPARED BY: A. NIEMEYER

1 INVESTMENT COSTS

A.	CONSTRUCTION COST	=	$335	
B.	SIOH COST	(5.5% of 1A) =	$18	
C.	DESIGN COST	(6.0% of 1A) =	$20	
D.	TOTAL COST	(1A + 1B + 1C) =	$373	
E.	SALVAGE VALUE	=	$0	
F.	SALVAGE VALUE OF EXISTING EQUIP.	=	$0	
G.	TOTAL INVESTMENT	(1D - 1E - 1F) =	--------->	$373

2 ENERGY SAVINGS (+) or COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS: OCTOBER 1992

	ENERGY SOURCE	COST $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A.	ELEC	$7.32		$0	11.70	$0	
B.	DIST		0	$0	13.78	$0	
C.	NAT GAS	$3.48	160	$557	14.16	$7,884	
D.	COAL		0	$0	11.57	$0	
E.	SOLAR			$0		$0	
F.	DEMAND SAVINGS	$69.68 / year		$0	11.12	$0	
G.	TOTAL		160	$557		--------->	$7,884

3 NONENERGY SAVINGS (+) or COST (-)

A. ANNUAL RECURRING			$0	
1 DISCOUNT FACTOR	(From Table A-2) =	11.12		
2 DISCOUNTED SAVINGS or COST	(3A x 3A1) =		$0	

B. NONRECURRING

ITEM	SAVINGS or COST (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3)	DISCOUNTED SVGS or COST (4)
a.	$0	0	0.00	$0
b.	$0	0	0.00	$0
c.	$0	0	0.00	$0
d TOTAL	$0			$0

C. TOTAL NONENERGY DISCOUNTED SAVINGS or COST   (3A2 + 3Bd4) = $0

4 SIMPLE PAYBACK (SPB) - (YRS)	1G/(2G3 + 3A + (3Bd1/15)) =	0.7
5 TOTAL NET DISCOUNTED SAVINGS	(2G5 + 3C) =	$7,884
6 SAVINGS-TO-INVESTMENT RATIO (SIR)	(5/1G) =	21.12
7 ADJUSTED INTERNAL RATE OF RETURN (AIRR) - (%)	[(1+.04) x SIR to 1/15 power - 1] x 100 =	27.45

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION:	FORT CARSON, COLORADO	REGION:	4	PROJECT NO:	
PROJECT TITLE:	FT CARSON EEAP UPDATE			FISCAL YEAR:	1992
DISCRETE PORTION NAME:	ECO #14 - NIGHT SETBACK THERMOSTAT			BUILDING NO.:	P-2155
ANALYSIS DATE:	04/14/93	ECONOMIC LIFE: 15		PREPARED BY:	A. NIEMEYER

1 INVESTMENT COSTS

A. CONSTRUCTION COST	=	$335		
B. SIOH COST	(5.5% of 1A) =	$18		
C. DESIGN COST	(6.0% of 1A) =	$20		
D. TOTAL COST	(1A + 1B + 1C) =	$373		
E. SALVAGE VALUE	=	$0		
F. SALVAGE VALUE OF EXISTING EQUIP.	=	$0		
G. TOTAL INVESTMENT	(1D - 1E - 1F) =	--------->		$373

2 ENERGY SAVINGS (+) or COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS: OCTOBER 1992

	ENERGY SOURCE	COST $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A.	ELEC	$7.32		$0	11.70	$0	
B.	DIST		0	$0	13.78	$0	
C.	NAT GAS	$3.48	160	$557	14.16	$7,884	
D.	COAL		0	$0	11.57	$0	
E.	SOLAR			$0		$0	
F.	DEMAND SAVINGS	$69.68 / year		$0	11.12	$0	
G.	TOTAL		160	$557		--------->	$7,884

3 NONENERGY SAVINGS (+) or COST (-)

A. ANNUAL RECURRING			$0
1 DISCOUNT FACTOR	(From Table A-2) =	11.12	
2 DISCOUNTED SAVINGS or COST	(3A x 3A1) =		$0

B. NONRECURRING

ITEM	SAVINGS or COST (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3)	DISCOUNTED SVGS or COST (4)
a.	$0	0	0.00	$0
b.	$0	0	0.00	$0
c.	$0	0	0.00	$0
d TOTAL	$0			$0

C. TOTAL NONENERGY DISCOUNTED SAVINGS or COST	(3A2 + 3Bd4) =	$0
4 SIMPLE PAYBACK (SPB) - (YRS)	1G/(2G3 + 3A + (3Bd1/15)) =	0.7
5 TOTAL NET DISCOUNTED SAVINGS	(2G5 + 3C) =	$7,884
6 SAVINGS-TO-INVESTMENT RATIO (SIR)	(5/1G) =	21.12
7 ADJUSTED INTERNAL RATE OF RETURN (AIRR) - (%)	[(1+.04) x SIR to 1/15 power - 1] x 100 =	27.45

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION: FORT CARSON, COLORADO   REGION: 4   PROJECT NO:
PROJECT TITLE: FT CARSON EEAP UPDATE   FISCAL YEAR: 1992
DISCRETE PORTION NAME: ECO #14 - NIGHT SETBACK THERMOSTAT   BUILDING NO.: P-2156
ANALYSIS DATE: 04/14/93   ECONOMIC LIFE: 15   PREPARED BY: A. NIEMEYER

1 INVESTMENT COSTS

A.	CONSTRUCTION COST	=	$335	
B.	SIOH COST	(5.5% of 1A) =	$18	
C.	DESIGN COST	(6.0% of 1A) =	$20	
D.	TOTAL COST	(1A + 1B + 1C) =	$373	
E.	SALVAGE VALUE	=	$0	
F.	SALVAGE VALUE OF EXISTING EQUIP.	=	$0	
G.	TOTAL INVESTMENT	(1D - 1E - 1F) =	--------->	$373

2 ENERGY SAVINGS (+) or COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS: OCTOBER 1992

	ENERGY SOURCE	COST $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A.	ELEC	$7.32		$0	11.70	$0	
B.	DIST		0	$0	13.78	$0	
C.	NAT GAS	$3.48	160	$557	14.16	$7,884	
D.	COAL		0	$0	11.57	$0	
E.	SOLAR			$0		$0	
F.	DEMAND SAVINGS	$69.68 / year		$0	11.12	$0	
G.	TOTAL		160	$557		--------->	$7,884

3 NONENERGY SAVINGS (+) or COST (-)

A. ANNUAL RECURRING			$0	
1 DISCOUNT FACTOR	(From Table A-2) =	11.12		
2 DISCOUNTED SAVINGS or COST	(3A x 3A1) =		$0	

B. NONRECURRING

ITEM	SAVINGS or COST (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3)	DISCOUNTED SVGS or COST (4)
a.	$0	0	0.00	$0
b.	$0	0	0.00	$0
c.	$0	0	0.00	$0
d TOTAL	$0			$0

C. TOTAL NONENERGY DISCOUNTED SAVINGS or COST (3A2 + 3Bd4) = $0

4 SIMPLE PAYBACK (SPB) - (YRS)	1G/(2G3 + 3A + (3Bd1/15)) =	0.7
5 TOTAL NET DISCOUNTED SAVINGS	(2G5 + 3C) =	$7,884
6 SAVINGS-TO-INVESTMENT RATIO (SIR)	(5/1G) =	21.12
7 ADJUSTED INTERNAL RATE OF RETURN (AIRR) - (%)	[(1+.04) x SIR to 1/15 power - 1] x 100 =	27.45

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION: FORT CARSON, COLORADO	REGION: 4	PROJECT NO:	
PROJECT TITLE: FT CARSON EEAP UPDATE		FISCAL YEAR:	1992
DISCRETE PORTION NAME: ECO #14 - NIGHT SETBACK THERMOSTAT		BUILDING NO.:	P-2700
ANALYSIS DATE: 04/14/93	ECONOMIC LIFE: 15	PREPARED BY:	A. NIEMEYER

1 INVESTMENT COSTS

A.	CONSTRUCTION COST	=	$2,344	
B.	SIOH COST	(5.5% of 1A) =	$129	
C.	DESIGN COST	(6.0% of 1A) =	$141	
D.	TOTAL COST	(1A + 1B + 1C) =	$2,614	
E.	SALVAGE VALUE	=	$0	
F.	SALVAGE VALUE OF EXISTING EQUIP.	=	$0	
G.	TOTAL INVESTMENT	(1D - 1E - 1F) =	---------->	$2,614

2 ENERGY SAVINGS (+) or COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS: OCTOBER 1992

	ENERGY SOURCE	COST $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A.	ELEC & DEMAND	$17.14		$0	11.70	$0	
B.	DIST			$0	13.78	$0	
C.	NAT GAS	$3.48	1,435	$4,988	14.16	$70,631	
D.	COAL			$0	11.57	$0	
E.	SOLAR			$0		$0	
F.	DEMAND SAVINGS	$69.68 / year		$0	11.12	$0	
G.	TOTAL		1,435	$4,988		---------->	$70,631

3 NONENERGY SAVINGS (+) or COST (-)

A.	ANNUAL RECURRING			$0
	1 DISCOUNT FACTOR	(From Table A-2) =	11.12	
	2 DISCOUNTED SAVINGS or COST	(3A x 3A1) =		$0

B. NONRECURRING

ITEM	SAVINGS or COST (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3)	DISCOUNTED SVGS or COST (4)
a.	$0	0	0.00	$0
b.	$0	0	0.00	$0
c.	$0	0	0.00	$0
d TOTAL	$0			$0

C. TOTAL NONENERGY DISCOUNTED SAVINGS or COST (3A2 + 3Bd4) = $0

4 SIMPLE PAYBACK (SPB) - (YRS)	1G/(2G3 + 3A + (3Bd1/15)) =	0.5
5 TOTAL NET DISCOUNTED SAVINGS	(2G5 + 3C) =	$70,631
6 SAVINGS-TO-INVESTMENT RATIO (SIR)	(5/1G) =	27.02
7 ADJUSTED INTERNAL RATE OF RETURN (AIRR) - (%)	[(1+.04) x SIR to 1/15 power - 1] x 100 =	29.56

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION:	FORT CARSON, COLORADO	REGION:	4	PROJECT NO:	
PROJECT TITLE:	FT CARSON EEAP UPDATE			FISCAL YEAR:	1992
DISCRETE PORTION NAME:	ECO #14 - NIGHT SETBACK THERMOSTAT			BUILDING NO.:	ALL BUILDINGS
ANALYSIS DATE:	04/14/93	ECONOMIC LIFE: 15		PREPARED BY:	A. NIEMEYER

1 INVESTMENT COSTS

A. CONSTRUCTION COST	=	$5,358		
B. SIOH COST	(5.5% of 1A) =	$295		
C. DESIGN COST	(6.0% of 1A) =	$321		
D. TOTAL COST	(1A + 1B + 1C) =	$5,974		
E. SALVAGE VALUE	=	$0		
F. SALVAGE VALUE OF EXISTING EQUIP.	=	$0		
G. TOTAL INVESTMENT	(1D - 1E - 1F) =	---------->	$5,974	

2 ENERGY SAVINGS (+) or COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS: OCTOBER 1992

ENERGY SOURCE	COST $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A. ELEC & DEMAND	$17.14	22	$377	11.70	$4,412	
B. DIST			$0	13.78	$0	
C. NAT GAS	$3.48	2,631	$9,145	14.16	$129,498	
D. COAL			$0	11.57	$0	
E. SOLAR			$0		$0	
F. DEMAND SAVINGS	$69.68 / year		$0	11.12	$0	
G. TOTAL		2,653	$9,522		---------->	$133,910

3 NONENERGY SAVINGS (+) or COST (-)

A. ANNUAL RECURRING			$0	
1 DISCOUNT FACTOR	(From Table A-2) =	11.12		
2 DISCOUNTED SAVINGS or COST	(3A x 3A1) =		$0	

B. NONRECURRING

ITEM	SAVINGS or COST (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3)	DISCOUNTED SVGS or COST (4)
a.	$0	0	0.00	$0
b.	$0	0	0.00	$0
c.	$0	0	0.00	$0
d TOTAL	$0			$0

C. TOTAL NONENERGY DISCOUNTED SAVINGS or COST (3A2 + 3Bd4) = $0

4 SIMPLE PAYBACK (SPB) - (YRS)	1G/(2G3 + 3A + (3Bd1/15)) =	0.6
5 TOTAL NET DISCOUNTED SAVINGS	(2G5 + 3C) =	$133,910
6 SAVINGS-TO-INVESTMENT RATIO (SIR)	(5/1G) =	22.42
7 ADJUSTED INTERNAL RATE OF RETURN (AIRR) - (%)	[(1+.04) x SIR to 1/15 power - 1] x 100 =	27.96

CONSTRUCTION COST ESTIMATE	DATE PREPARED 13-Apr-93	SHEET 1 OF 1

Project UPDATE EXISTING EEAP	BASIS FOR ESTIMATE
Location FORT CARSON, COLORADO	X Code A (No design completed) _ Code B (Preliminary design) _ Code C (Final design) _ Other (Specify)
Architect-Engineer E M C ENGINEERS, INC., 2750 S. WADSWORTH BLVD., DENVER, CO 80227	

Drawing No.	Estimator A. NIEMEYER	Checked by T. FORSTER

ECO #14 Night Setback Thermostats	Quantity No. Units	Unit Meas.	Labor Per Unit	Total	Material Per Unit	Total	Total Cost
Install Setback Thermostat with wiring	1	EA	20.67	20.67	112.14	112.14	$132.80
Install 24 volt Transformer with wiring	1	EA	20.67	20.67	80.89	80.89	$101.56
Subtotal - Direct Costs per Installation				41.33		193.03	234.36
Overhead, Bond, Ins. (16.8%)							$39.37
Workers Comp. Ins. (7.3%)							$3.02
Profit (10%)							$27.68
Contingency (10%)							$30.44
TOTAL PER UNIT							$334.87

BUILDING NO.	No. Units	Unit Meas.	Labor and Material with Overhead, Profit, and Cont. Total	Total Contract Cost
P-1007	3	EA	$334.87	$1,004.61
P-1955	1	EA	$334.87	$334.87
P-1956	1	EA	$334.87	$334.87
P-2055	1	EA	$334.87	$334.87
P-2056	1	EA	$334.87	$33[illegible]
P-2155	1	EA	$334.87	$334.87
P-2156	1	EA	$334.87	$334.87
P-2700	7	EA	$334.87	$2,344.09
TOTAL ECO #14				$5,357.92

ENG FORM 150
1 AUG 59
PREVIOUS EDITION MAY BE USED
*U.S. GOVERNMENT PRINTING OFFICE 1959 0-516148

BCEP INPUT FORM

EMC ENGINEERS, INC. DENVER, COLORADO

CASE TYPE NEW (1) EXISTING (2)	EXISTING INPUT FILE (XXXXXX.IN)	BIN CHART FOR THIS RUN (XBINXX.XX)
(2)	1955.IN	FCBIN.2

PROJECT DESCRIPTION (20 CHAR)	CASE DESCRIPTION (20 CHAR)	CASE or ECM #	DATE (mm/dd/yy)
FTCARSON UPDATE EEAP	BASELINE	∅	11/4/92

PREPARED BY: (6C)	BUILDING NAME: (6C)	TOTAL FLOOR AREA (R)	# OF ZONES (I)	ZONE NUMBER (I)	FAN SYSTEM Y N
AJN	P-1955	2060.0	1	1	Y

HEATING	MONTH ON (00-12) (I)	MONTH OFF (01-12) (I)	DD CORR. FACTOR (R)	FUEL TYPE (I)	EQPT. CAPACITY (R)	# PART LOAD PTS 2 MIN 11 MAX
	9	5	1.0	3	100,830	2

	1	2	3	4	5	6	7	8	9	10	11
PART LOAD POINTS (R)	0.1	1.0									
EFFICIENCY POINTS (R)	.63	.63									

COOLING	MONTH ON (00-12) (I)	MONTH OFF (01-12) (I)	FUEL TYPE (I)	EQPT. CAPACITY (R)	# PART LOAD PTS. 2 MIN 11 MAX
	5	9	3	74,855	2

	1	2	3	4	5	6	7	8	9	10	11
PART LOAD POINTS	0.1	1.0									
EFFICIENCY POINTS	.52	.52									

BIN Nº HEATING BEGINS (I)	BIN Nº COOLING BEGINS (I)	HEAT NON-WORK HOURS ? Y N	COOL NON-WORK HOURS ? Y N
17	20	Y	Y

CONDUCTION	RUN THIS ZONE ? Y N	SOLAR RAD DISK FILE:
	Y	SOLAR.NE

	WALLS NORTH	EAST	SOUTH	WEST	ROOF
AREA (R)	483.0	657.3	483.0	589.3	1995.0
U-VALUE (R)	0.1	0.1	0.1	0.1	0.044
COLOR ADJUSTMENT FACTOR (R)	0.65	0.65	0.65	0.65	0.8
CLTD (I)	423	507	511	422	698
EXTERNAL SHADE FACTOR (R)	0.8	1.0	0.8	1.0	1.0

ATTIC VENTILATION ? Y N	PERCENT POSSIBLE SUMMER SUNSHINE (R)	PERCENT POSSIBLE WINTER SUNSHINE (R)
N	67.0	66.0

	GLASS (VERTICAL) N	NE	E	SE	S	SW	W	NW	SKYLIGHT or ROOF GLASS
AREA (R)		73.0				73.0		67.5	
U-FACTOR (R)		1.18				1.18		1.18	
SHADING COEFFICIENT (R)		1.0				1.0		1.0	
COOLING LOAD FACTOR (R)		5.17				6.23		5.16	
MAX SHGF, SUMMER (I)		163				170		163	
MAX SHGF, WINTER (I)		20				241		20	
EXTERNAL SHADE FACTOR (R)		0.4				0.4		1.0	

FLOOR TYPE 0 NONE 1 PERIM 2 CRAWL	(2) FLOOR AREA (R)	(2) FLOOR U-VALUE (R)	CRAWL SPACE TEMPERATURE (R)	EXPOSED PERIMETER LENGTH (R)
1	—	0.5	S — W —	211.0

TEMP RANGE (I)	DESIGN DAY TEMPERATURE (R)	SPACE HEATING TEMPERATURE (R)	SPACE COOLING TEMPERATURE (R)
30	S 91.0 W -3.0	D 72.0 N 72.0	D 72.0 N 72.0

CONVECTION Y N	ELEVATION	AIR FLOW RATES—OCCUP/UNOCUP	HEATING AIR TEMP (R)	COOLING AIR TEMP (R)
Y	5840	0.0 ACFM(R) 0.0 ACFM(R)	D 72.0 N 72.0	D 72.0 N 0.0

INTERNAL GAINS	RUN THIS ZONE ? Y N	Nº of TYPES ? (I)				
	Y					

		INTERNAL GAINS TYPES DHW (1)	LIGHTS (2)	APPLIANCES (3)	MISC. (4)	PEOPLE (5)
DAY:	FUEL TYPE (I)		1		1	X
	BTUH / UNIT (R)		10,106.0		1757.0	255.0
	NUMBER OF UNITS (I)		1		1	2
	SPACE LOAD FACTOR (R)		0.9		1.0	1.0
	SCHEDULE CORRECTION FACTOR (R)		0.75		1.0	1.0
NIGHT:	BTUH / UNIT (R)		10,106.0		1757.0	0.0
	NUMBER OF UNITS (I)		1		1	∅
	SPACE LOAD FACTOR (R)		0.9		1.0	1.0
	SCHEDULE CORRECTION FACTOR (R)		0.1		0.05	1.0
	EFFICIENCY (R)		100.0		100.0	X

INPUT FILE (XXXXXX.IN) 1955.IN OUTPUT FILE (XXXXXX.RPT) 1955.RPT

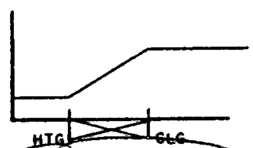
VBCEP INPUT FORM

EMC ENGINEERS, INC. DENVER, COLORADO

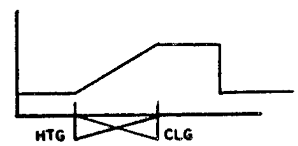
BUILDING NUMBER
P-1955

SUPPLY AIR (ACFM)	OCCUPIED HOURS: 3225.0 (R)	UNOCCUPIED HOURS: 3225.0 (R)
MAX OA/SA RATIO	OCCUPIED HOURS: 0.20 (R)	UNOCCUPIED HOURS: 0.20 (R)
MIN OA/SA RATIO	OCCUPIED HOURS: 0.20 (R)	UNOCCUPIED HOURS: 0.20 (R)
APPROXIMATE RETURN AIR TEMP, °F	HEATING OCCUPIED HOURS 72.0 (R)	HEATING UNOCCUPIED HOURS 72.0 (R)
	COOLING OCCUPIED HOURS 72.0 (R)	COOLING UNOCCUPIED HOURS 72.0 (R)
	DESIRED MIXED AIR TEMPERATURE, °F 0.0 IF FIXED OA OR ZONE CONTROLLED 0.0 (R)	

ECONOMIZER TYPES



TYPE 1 – "DUMB"



TYPE 2 – "SMART"

ELEVATION IN FEET (R) 5840.0

DEBUG REPORT	1 = MONTHLY MIXED AIR REPORT BY BIN INCREMENT 2 = ANNUAL REPORT BY MONTH

PROJECT--FT CARSON UPDATE EEAP

BUILDING--P-1955
CASE--BASELINE
DATE--11/10/92
PREPARED BY--AJN

ZONE # 1
CASE #0

******************** BIN HEATING AND COOLING ********************
******************** LOADS REPORT ********************
******************** BUILDING BOUNDARY ********************

BIN F	HOURS 7-16	HOURS 17- 6	MECH HEATING LOADS 7 - 16 MBTU	MECH HEATING LOADS 17 - 6 MBTU	MECH COOLING LOADS 7 - 16 MBTU	MECH COOLING LOADS 17 - 6 MBTU
-25 to -20	0	0	.0000	.0000	.0000	.0000
-20 to -15	0	0	.0000	.0000	.0000	.0000
-15 to -10	0	0	.0000	.0000	.0000	.0000
-10 to -5	0	2	.0000	.1007	.0000	.0000
-5 to 0	0	8	.0000	.3757	.0000	.0000
0 to 5	15	94	.4875	4.0913	.0000	.0000
5 to 10	17	121	.4909	4.8744	.0000	.0000
10 to 15	37	168	.9362	6.2243	.0000	.0000
15 to 20	55	303	1.1932	10.2100	.0000	.0000
20 to 25	97	376	1.7577	11.4060	.0000	.0000
25 to 30	112	486	1.6054	13.0760	.0000	.0000
30 to 35	94	353	1.0085	8.3060	.0000	.0000
35 to 40	144	407	1.0187	8.1440	.0000	.0000
40 to 45	135	493	.4385	7.7602	.0000	.0000
45 to 50	181	594	.0069	7.0183	.0000	.0000
50 to 55	175	556	.0000	4.3211	.0000	.0000
55 to 60	178	563	.0000	2.1864	.0000	.0000
60 to 65	192	621	.0000	.0000	.0000	.0000
65 to 70	210	521	.0000	.0000	.0000	.0000
70 to 75	193	327	.0000	.0000	3.0122	1.4548
75 to 80	192	220	.0000	.0000	3.9081	1.7473
80 to 85	163	114	.0000	.0000	4.4666	1.3088
85 to 90	135	74	.0000	.0000	4.2606	1.1270
90 to 95	15	19	.0000	.0000	.5280	.3527
95 to 100	0	0	.0000	.0000	.0000	.0000
100 to 105	0	0	.0000	.0000	.0000	.0000
ANN	2340	6420	8.9435	88.0941	16.1755	5.9906

PROJECT--FT CARSON UPDATE EEAP

BUILDING--P-1955
CASE--BASELINE
DATE--11/10/92
PREPARED BY--AJN

ZONE # 1
CASE #0

******************** MONTHLY HEATING AND COOLING ********************
******************** LOADS REPORT ********************
******************** BUILDING BOUNDARY ********************

MONTH	MECH HEATING LOADS 7 - 16 MBTU	MECH HEATING LOADS 17 - 6 MBTU	MECH COOLING LOADS 7 - 16 MBTU	MECH COOLING LOADS 17 - 6 MBTU
01 JAN	2.2403	15.9270	.0000	.0000
02 FEB	2.0337	14.2660	.0000	.0000
03 MAR	1.1618	12.2380	.0000	.0000
04 APR	.3621	7.0492	.0000	.0000
05 MAY	.0214	4.2106	1.0158	.3521
06 JUN	.0000	.0000	2.5950	.6062
07 JUL	.0000	.0000	4.8587	2.7834
08 AUG	.0000	.0000	4.6110	1.3376
09 SEP	.0089	2.8582	3.0950	.9112
10 OCT	.0586	6.5823	.0000	.0000
11 NOV	1.7168	12.1200	.0000	.0000
12 DEC	1.3401	12.8430	.0000	.0000
ANN	8.9435	88.0941	16.1755	5.9906

Building Boundary Energy per Square
Foot of Total Building area = 57865.8 BTU

PROJECT--FT CARSON UPDATE EEAP

BUILDING--P-1955
CASE--BASELINE
DATE--11/10/92
PREPARED BY--AJN

ZONE # 1
CASE #0

******************** BIN SOLAR ENERGY REPORT ********************
******************** DIRECT GAIN THROUGH ********************
******************** WINDOWS AND SKYLIGHTS ********************

BIN F	HOURS 7-16	SOLAR DIRECT GAIN 7 - 16 MBTU
-25 to -20	0	.0000
-20 to -15	0	.0000
-15 to -10	0	.0000
-10 to -5	0	.0000
-5 to 0	0	.0000
0 to 5	15	.0444
5 to 10	17	.0556
10 to 15	37	.1326
15 to 20	55	.2142
20 to 25	97	.4078
25 to 30	112	.5056
30 to 35	94	.4535
35 to 40	144	.7395
40 to 45	135	.7351
45 to 50	181	1.0418
50 to 55	175	1.0616
55 to 60	178	1.1350
60 to 65	192	1.2838
65 to 70	210	1.4694
70 to 75	193	1.4103
75 to 80	192	1.4626
80 to 85	163	1.2922
85 to 90	135	1.1122
90 to 95	15	.1282
95 to 100	0	.0000
100 to 105	0	.0000
ANN	2340	14.6855

PROJECT--FT CARSON UPDATE EEAP

BUILDING--P-1955
CASE--BASELINE
DATE--11/10/92
PREPARED BY--AJN

ZONE # 1
CASE #0

******************* MONTHLY INTERNAL GAINS REPORT: *******************
******************* LOADS AND RAW SOURCE ENERGY *******************
******************* CONSUMPTION *******************

MONTH	LIGHTS ELEC MBTU	MISC ELEC MBTU	PEOPLE MBTU	APPLIANC ELEC MBTU
01 J	1.9934	.3808	.0964	3.2684
02 F	1.8615	.3595	.0918	2.9521
03 M	2.1116	.4109	.1056	3.2684
04 A	1.9692	.3787	.0964	3.1630
05 M	2.0525	.3959	.1010	3.2684
06 J	2.0283	.3937	.1010	3.1630
07 J	1.9934	.3808	.0964	3.2684
08 A	2.1116	.4109	.1056	3.2684
09 S	2.0283	.3937	.1010	3.1630
10 O	1.9934	.3808	.0964	3.2684
11 N	2.0283	.3937	.1010	3.1630
12 D	2.0525	.3959	.1010	3.2684
TOT	24.2241	4.6754	1.1934	38.4827
RAW SOURCE	82.3321	15.8905	1.1934	130.7937

PROJECT--FT CARSON UPDATE EEAP

BUILDING--P-1955
CASE--BASELINE
DATE--11/10/92
PREPARED BY--AJN

ALL ZONES
CASE #0

******************* MONTHLY HEATING AND COOLING *******************
******************* OUTSIDE AIR LOADS *******************
******************* BUILDING BOUNDARY *******************

MONTH	HEATING MBTU	COOLING MBTU
01 JAN	18.96422	.00000
02 FEB	17.23809	.00000
03 MAR	14.94177	.00000
04 APR	9.12972	.00000
05 MAY	5.61314	.16279
06 JUN	.00000	.58685
07 JUL	.00000	2.19137
08 AUG	.00000	1.26906
09 SEP	3.48385	.90961
10 OCT	7.33532	.00000
11 NOV	14.99481	.00000
12 DEC	15.18469	.00000
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ANN	106.88560	5.11968

PROJECT--FT CARSON UPDATE EEAP

BUILDING--P-1955
CASE--BASELINE
DATE--11/10/92
PREPARED BY--AJN

ALL ZONES
CASE #0

******************** MONTHLY HEATING AND COOLING ********************
******************** RAW SOURCE ENERGY ********************
******************** CONSUMPTION REPORT ********************

MONTH	TOTAL HEATING NAT GAS MBTU	TOTAL COOLING NAT GAS MBTU
01 J	58.8461	.0000
02 F	53.1498	.0000
03 M	44.9152	.0000
04 A	26.2139	.0000
05 M	15.6024	2.9380
06 J	.0000	7.2706
07 J	.0000	18.8742
08 A	.0000	13.8534
09 S	10.0648	9.4355
10 O	22.1492	.0000
11 N	45.6918	.0000
12 D	46.5416	.0000
ANN	323.1747	52.3718

BTU/SF/YR HEATING: 156880.9 COOLING: 25423.2

Raw Source Energy per Square
Foot of Total Building Area = 182304.1 BTU

BCEP INPUT FORM

EMC ENGINEERS, INC. — DENVER, COLORADO

CASE TYPE NEW (1) EXISTING (2)	EXISTING INPUT FILE (XXXXXX.IN) 1955.I14	Only Changes Are Shown.	BIN CHART FOR THIS RUN (XBINXX.XX)

PROJECT DESCRIPTION (20 CHAR)	CASE DESCRIPTION (20 CHAR)	CASE or ECM #	DATE (mm/dd/yy)
	NIGHT SETBACK	1	11/10/92

PREPARED BY: (6C)	BUILDING NAME: (6C)	TOTAL FLOOR AREA (R)	# OF ZONES (I)	ZONE NUMBER (I)	FAN SYSTEM Y N

HEATING	MONTH ON (00-12) (I)	MONTH OFF (01-12) (I)	DD CORR. FACTOR (R)	FUEL TYPE (I)	EQPT. CAPACITY (R)	# PART LOAD PTS 2 MIN 11 MAX

PART LOAD POINTS (R)	1	2	3	4	5	6	7	8	9	10	11	EFFICIENCY POINTS (R)	1	2	3	4	5	6	7	8	9	10	11

COOLING	MONTH ON (00-12) (I)	MONTH OFF (01-12) (I)		FUEL TYPE (I)	EQPT. CAPACITY (R)	# PART LOAD PTS. 2 MIN 11 MAX

PART LOAD POINTS	1	2	3	4	5	6	7	8	9	10	11	EFFICIENCY POINTS	1	2	3	4	5	6	7	8	9	10	11

BIN Nº HEATING BEGINS (I)	BIN Nº COOLING BEGINS (I)	HEAT NON-WORK HOURS ? Y N	COOL NON-WORK HOURS ? Y N

CONDUCTION	RUN THIS ZONE ? Y N		SOLAR RAD DISK FILE:

	WALLS NORTH	EAST	SOUTH	WEST	ROOF
AREA (R)					
U-VALUE (R)					
COLOR ADJUSTMENT FACTOR (R)					
CLTD (I)					
EXTERNAL SHADE FACTOR (R)					

ATTIC VENTILATION ? Y N	PERCENT POSSIBLE SUMMER SUNSHINE (R)	PERCENT POSSIBLE WINTER SUNSHINE (R)

GLASS (VERTICAL)	N	NE	E	SE	S	SW	W	NW	SKYLIGHT or ROOF GLASS
AREA (R)									
U-FACTOR (R)									
SHADING COEFFICIENT (R)									
COOLING LOAD FACTOR (R)									
MAX SHGF, SUMMER (I)									
MAX SHGF, WINTER (I)									
EXTERNAL SHADE FACTOR (R)									

FLOOR TYPE 0: NONE 1: PERIM. 2: CRAWL	(2) FLOOR AREA (R)	(2) FLOOR U-VALUE (R)	CRAWL SPACE TEMPERATURE S W (R)	EXPOSED PERIMETER LENGTH (R)

TEMP RANGE (I)		DESIGN DAY TEMPERATURE (R) S W	SPACE HEATING TEMPERATURE (R) D 68.0 N 55.0	SPACE COOLING TEMPERATURE (R) D 78.0 N 100.0

CONVECTION Y N	ELEVATION	AIR FLOW RATES-OCCUP/UNOCUP ACFM(R) ACFM(R)	HEATING AIR TEMP (R) D 68.0 N 55.0	COOLING AIR TEMP (R) D 78.0 N 100.0

INTERNAL GAINS	RUN THIS ZONE ? Y N	Nº of TYPES ? (I)	INTERNAL GAINS TYPES DHW (1)	LIGHTS (2)	APPLIANCES (3)	MISC. (4)	PEOPLE (5)
DAY:	FUEL TYPE	(I)					X
	BTUH / UNIT	(R)					
	NUMBER OF UNITS	(I)					
	SPACE LOAD FACTOR	(R)					
	SCHEDULE CORRECTION FACTOR	(R)					
NIGHT:	BTUH / UNIT	(R)					
	NUMBER OF UNITS	(I)					
	SPACE LOAD FACTOR	(R)					
	SCHEDULE CORRECTION FACTOR	(R)					
	EFFICIENCY	(R)					X

INPUT FILE (XXXXXX.IN) 1955.I14 — OUTPUT FILE (XXXXXX.RPT) 1955.R14

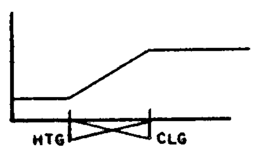
VBCEP INPUT FORM

EMC ENGINEERS, INC. DENVER, COLORADO

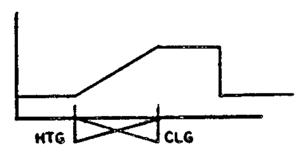
BUILDING NUMBER
P-1955

SUPPLY AIR (ACFM)	OCCUPIED HOURS: (R)	UNOCCUPIED HOURS: (R)
MAX OA/SA RATIO	OCCUPIED HOURS: (R)	UNOCCUPIED HOURS: (R)
MIN OA/SA RATIO	OCCUPIED HOURS: (R)	UNOCCUPIED HOURS: (R)
APPROXIMATE RETURN AIR TEMP, °F	HEATING OCCUPIED HOURS 68.0 (R)	HEATING UNOCCUPIED HOURS 55.0 (R)
	COOLING OCCUPIED HOURS 78.0 (R)	COOLING UNOCCUPIED HOURS 120.0 (R)
	DESIRED MIXED AIR TEMPERATURE, °F 0.0 IF FIXED OA OR ZONE CONTROLLED (R)	

ECONOMIZER TYPES



TYPE 1 – "DUMB"



TYPE 2 – "SMART"

ELEVATION IN FEET (R)

DEBUG REPORT	1 = MONTHLY MIXED AIR REPORT BY BIN INCREMENT 2 = ANNUAL REPORT BY MONTH

PROJECT--FT CARSON UPDATE EEAP

BUILDING--P-1955 ZONE # 1
CASE--ECO #14 - NIGHT SETBACK CASE #1
DATE--11/10/92
PREPARED BY--AJN

******************** BIN HEATING AND COOLING ********************
******************** LOADS REPORT ********************
******************** BUILDING BOUNDARY ********************

BIN F	HOURS 7-16	HOURS 17- 6	MECH HEATING LOADS 7 - 16 MBTU	MECH HEATING LOADS 17 - 6 MBTU	MECH COOLING LOADS 7 - 16 MBTU	MECH COOLING LOADS 17 - 6 MBTU
-25 to -20	0	0	.0000	.0000	.0000	.0000
-20 to -15	0	0	.0000	.0000	.0000	.0000
-15 to -10	0	0	.0000	.0000	.0000	.0000
-10 to -5	0	2	.0000	.0780	.0000	.0000
-5 to 0	0	8	.0000	.2851	.0000	.0000
0 to 5	15	94	.4475	3.0262	.0000	.0000
5 to 10	17	121	.4456	3.5034	.0000	.0000
10 to 15	37	168	.8375	4.3208	.0000	.0000
15 to 20	55	303	1.0466	6.7769	.0000	.0000
20 to 25	97	376	1.4991	7.1463	.0000	.0000
25 to 30	112	486	1.3068	7.5692	.0000	.0000
30 to 35	94	353	.7579	4.3065	.0000	.0000
35 to 40	144	407	.6348	3.5667	.0000	.0000
40 to 45	135	493	.0821	2.4691	.0000	.0000
45 to 50	181	594	.0000	1.0133	.0000	.0000
50 to 55	175	556	.0000	.0000	.0000	.0000
55 to 60	178	563	.0000	.0000	.0000	.0000
60 to 65	192	621	.0000	.0000	.0000	.0000
65 to 70	210	521	.0000	.0000	.0000	.0000
70 to 75	193	327	.0000	.0000	2.4453	.0000
75 to 80	192	220	.0000	.0000	3.2830	.0000
80 to 85	163	114	.0000	.0000	3.8454	.0166
85 to 90	135	74	.0000	.0000	3.7363	.2578
90 to 95	15	19	.0000	.0000	.4698	.1295
95 to 100	0	0	.0000	.0000	.0000	.0000
100 to 105	0	0	.0000	.0000	.0000	.0000
ANN	2340	6420	7.0580	44.0616	13.7798	.4039

PROJECT--FT CARSON UPDATE EEAP

BUILDING--P-1955 ZONE # 1
CASE--ECO #14 - NIGHT SETBACK CASE #1
DATE--11/10/92
PREPARED BY--AJN

******************** MONTHLY HEATING AND COOLING ********************
******************** LOADS REPORT ********************
******************** BUILDING BOUNDARY ********************

MONTH	MECH HEATING LOADS 7 - 16 MBTU	MECH HEATING LOADS 17 - 6 MBTU	MECH COOLING LOADS 7 - 16 MBTU	MECH COOLING LOADS 17 - 6 MBTU
01 JAN	1.8054	9.6462	.0000	.0000
02 FEB	1.6791	8.7179	.0000	.0000
03 MAR	.9112	6.4869	.0000	.0000
04 APR	.2123	2.5727	.0000	.0000
05 MAY	.0067	.6087	.8411	.0002
06 JUN	.0000	.0000	2.1950	.0260
07 JUL	.0000	.0000	4.1753	.3014
08 AUG	.0000	.0000	3.9276	.0529
09 SEP	.0009	.3440	2.6407	.0235
10 OCT	.0319	2.0616	.0000	.0000
11 NOV	1.3695	6.5307	.0000	.0000
12 DEC	1.0411	7.0929	.0000	.0000
ANN	7.0580	44.0616	13.7798	.4039

Building Boundary Energy per Square
Foot of Total Building area = 31700.6 BTU

PROJECT--FT CARSON UPDATE EEAP

BUILDING--P-1955
CASE--ECO #14 - NIGHT SETBACK
DATE--11/10/92
PREPARED BY--AJN

ZONE # 1
CASE #1

******************** BIN SOLAR ENERGY REPORT ********************
******************** DIRECT GAIN THROUGH ********************
******************** WINDOWS AND SKYLIGHTS ********************

BIN F	HOURS 7-16	SOLAR DIRECT GAIN 7 - 16 MBTU
-25 to -20	0	.0000
-20 to -15	0	.0000
-15 to -10	0	.0000
-10 to -5	0	.0000
-5 to 0	0	.0000
0 to 5	15	.0444
5 to 10	17	.0556
10 to 15	37	.1326
15 to 20	55	.2142
20 to 25	97	.4078
25 to 30	112	.5056
30 to 35	94	.4535
35 to 40	144	.7395
40 to 45	135	.7351
45 to 50	181	1.0418
50 to 55	175	1.0616
55 to 60	178	1.1350
60 to 65	192	1.2838
65 to 70	210	1.4694
70 to 75	193	1.4103
75 to 80	192	1.4626
80 to 85	163	1.2922
85 to 90	135	1.1122
90 to 95	15	.1282
95 to 100	0	.0000
100 to 105	0	.0000
ANN	2340	14.6855

PROJECT--FT CARSON UPDATE EEAP

BUILDING--P-1955 ZONE # 1
CASE--ECO #14 - NIGHT SETBACK CASE #1
DATE--11/10/92
PREPARED BY--AJN

****************** MONTHLY INTERNAL GAINS REPORT: ******************
****************** LOADS AND RAW SOURCE ENERGY ******************
****************** CONSUMPTION ******************

MONTH	LIGHTS ELEC MBTU	MISC ELEC MBTU	PEOPLE MBTU	APPLIANC ELEC MBTU
01 J	1.9934	.3808	.0964	3.2684
02 F	1.8615	.3595	.0918	2.9521
03 M	2.1116	.4109	.1056	3.2684
04 A	1.9692	.3787	.0964	3.1630
05 M	2.0525	.3959	.1010	3.2684
06 J	2.0283	.3937	.1010	3.1630
07 J	1.9934	.3808	.0964	3.2684
08 A	2.1116	.4109	.1056	3.2684
09 S	2.0283	.3937	.1010	3.1630
10 O	1.9934	.3808	.0964	3.2684
11 N	2.0283	.3937	.1010	3.1630
12 D	2.0525	.3959	.1010	3.2684
TOT	24.2241	4.6754	1.1934	38.4827
RAW SOURCE	82.3321	15.8905	1.1934	130.7937

PROJECT--FT CARSON UPDATE EEAP

BUILDING--P-1955 ALL ZONES
CASE--ECO #14 - NIGHT SETBACK CASE #1
DATE--11/10/92
PREPARED BY--AJN

******************** MONTHLY HEATING AND COOLING ********************
******************** OUTSIDE AIR LOADS ********************
******************** BUILDING BOUNDARY ********************

MONTH	HEATING MBTU	COOLING MBTU
01 JAN	13.21367	.00000
02 FEB	12.11502	.00000
03 MAR	9.56449	.00000
04 APR	4.74331	.00000
05 MAY	2.01729	.09367
06 JUN	.00000	.29060
07 JUL	.00000	.57218
08 AUG	.00000	.45283
09 SEP	.95335	.38850
10 OCT	3.15459	.00000
11 NOV	9.78682	.00000
12 DEC	9.87343	.00000
	----------	----------
ANN	65.42197	1.79779

PROJECT--FT CARSON UPDATE EEAP

BUILDING--P-1955 ALL ZONES
CASE--ECO #14 - NIGHT SETBACK CASE #1
DATE--11/10/92
PREPARED BY--AJN

******************** MONTHLY HEATING AND COOLING ********************
******************** RAW SOURCE ENERGY ********************
******************** CONSUMPTION REPORT ********************

MONTH	TOTAL HEATING NAT GAS MBTU	TOTAL COOLING NAT GAS MBTU
01 J	39.0891	.0000
02 F	35.6767	.0000
03 M	26.8821	.0000
04 A	11.9307	.0000
05 M	4.1722	1.7945
06 J	.0000	4.8209
07 J	.0000	9.6908
08 A	.0000	8.5092
09 S	2.0575	5.8593
10 O	8.3170	.0000
11 N	28.0301	.0000
12 D	28.5379	.0000
ANN	184.6933	30.6747

BTU/SF/YR HEATING: 89657.0 COOLING: 14890.6

Raw Source Energy per Square
Foot of Total Building Area = 104547.6 BTU

BCEP INPUT FORM

EMC ENGINEERS, INC. DENVER, COLORADO

CASE TYPE NEW (1) EXISTING (2)	EXISTING INPUT FILE (XXXXXX.IN)	BIN CHART FOR THIS RUN (XBINXX.XX)
2	2055.IN	FCBIN.2

PROJECT DESCRIPTION (20 CHAR)	CASE DESCRIPTION (20 CHAR)	CASE or ECM #	DATE (mm/dd/yy)
FTCARSON UPDATE EEAP	BASELINE	Ø	11/20/92

PREPARED BY: (6C)	BUILDING NAME: (6C)	TOTAL FLOOR AREA (R)	# OF ZONES (1)	ZONE NUMBER (1)	FAN SYSTEM Y N
AJW	P-2055	2060.0		1	Y

HEATING	MONTH ON (00-12) (1)	MONTH OFF (01-12) (1)	DD CORR. FACTOR (R)	FUEL TYPE (1)	EQPT. CAPACITY (R)	# PART LOAD PTS 2 MIN 11 MAX
	9	5	1.0	3	100,030	2

PART LOAD POINTS (R)	1	2	3	4	5	6	7	8	9	10	11
	0.1	1.0									

EFFICIENCY POINTS (R)	1	2	3	4	5	6	7	8	9	10	11
	.63	.63									

COOLING	MONTH ON (00-12) (1)	MONTH OFF (01-12) (1)	FUEL TYPE (1)	EQPT. CAPACITY (R)	# PART LOAD PTS. 2 MIN 11 MAX
	5	9	3	74,855	2

PART LOAD POINTS	1	2	3	4	5	6	7	8	9	10	11
	0.1	1.0									

EFFICIENCY POINTS	1	2	3	4	5	6	7	8	9	10	11
	.52	.52									

BIN Nº HEATING BEGINS (1)	BIN Nº COOLING BEGINS (1)	HEAT NON-WORK HOURS ? Y N	COOL NON-WORK HOURS ? Y N
17	20	Y	Y

CONDUCTION	RUN THIS ZONE ? Y N	SOLAR RAD DISK FILE:
	Y	SOLAR.NE

	WALLS NORTH	EAST	SOUTH	WEST	ROOF
AREA (R)	483.0	657.33	483.0	589.3	1995.0
U-VALUE (R)	0.10	0.10	0.1	0.1	0.044
COLOR ADJUSTMENT FACTOR (R)	0.65	0.65	0.65	0.65	0.8
CLTD (1)	423	507	511	422	698
EXTERNAL SHADE FACTOR (R)	0.8	1.0	0.8	1.0	1.0

ATTIC VENTILATION ? Y N	PERCENT POSSIBLE SUMMER SUNSHINE (R)	PERCENT POSSIBLE WINTER SUNSHINE (R)
N	67.0	66.0

	GLASS (VERTICAL) N	NE	E	SE	S	SW	W	NW	SKYLIGHT or ROOF GLASS
AREA (R)		73.0				73.0		67.5	
U-FACTOR (R)		1.18				1.18		1.18	
SHADING COEFFICIENT (R)		1.0				1.0		1.0	
COOLING LOAD FACTOR (R)		5.17				6.23		5.16	
MAX SHGF, SUMMER (1)		163				170		163	
MAX SHGF, WINTER (1)		20				241		20	
EXTERNAL SHADE FACTOR (R)		0.4				0.4		1.0	

FLOOR TYPE 0 NONE 1 PERIM 2 CRAWL	(2) FLOOR AREA (R)	(2) FLOOR U-VALUE (R)	CRAWL SPACE TEMPERATURE (R)	EXPOSED PERIMETER LENGTH (R)
1	—	0.5	S — W —	211.0

TEMP RANGE (1)	DESIGN DAY TEMPERATURE (R)	SPACE HEATING TEMPERATURE (R)	SPACE COOLING TEMPERATURE (R)
30	S 91.0 W -3.0	D 72.0 N 72.0	D 72.0 N 72.0

CONVECTION Y N	ELEVATION	AIR FLOW RATES-OCCUP/UNOCUP	HEATING AIR TEMP (R)	COOLING AIR TEMP (R)
Y	5840	0.0 ACFM(R) 0.0 ACFM(R)	D 72.5.0 N 72.0	D 72.0 N 0.0

INTERNAL GAINS	RUN THIS ZONE ? Y N	Nº of TYPES ? (1)	DHW (1)	LIGHTS (2)	APPLIANCES (3)	MISC. (4)	PEOPLE (5)
	Y						
DAY:	FUEL TYPE	(1)		1		1	
	BTUH / UNIT	(R)		10,106.0		1757.0	255.0
	NUMBER OF UNITS	(1)		1		1	2
	SPACE LOAD FACTOR	(R)		0.9		1.0	1.0
	SCHEDULE CORRECTION FACTOR	(R)		0.75		1.0	1.0
NIGHT:	BTUH / UNIT	(R)		10,106.0		1757.0	0.0
	NUMBER OF UNITS	(1)		1		1	0
	SPACE LOAD FACTOR	(R)		0.9		1.0	1.0
	SCHEDULE CORRECTION FACTOR	(R)		0.1		0.05	1.0
	EFFICIENCY	(R)		100.0		100.0	

INPUT FILE (XXXXXX.IN) 2055.IN OUTPUT FILE (XXXXXX.RPT) 2055.RPT

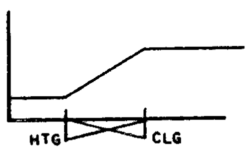
VBCEP INPUT FORM

EMC ENGINEERS, INC. DENVER, COLORADO

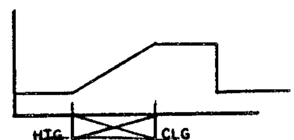
BUILDING NUMBER
P-2055

SUPPLY AIR (ACFM)	OCCUPIED HOURS: 3225.0 (R)	UNOCCUPIED HOURS: 3225.0 (R)
MAX OA/SA RATIO	OCCUPIED HOURS: 0.95 (R)	UNOCCUPIED HOURS: 0.05 (R)
MIN OA/SA RATIO	OCCUPIED HOURS: 0.05 (R)	UNOCCUPIED HOURS: 0.05 (R)
APPROXIMATE RETURN AIR TEMP, °F	HEATING OCCUPIED HOURS 72.0 (R)	HEATING UNOCCUPIED HOURS 72.0 (R)
	COOLING OCCUPIED HOURS 72.0 (R)	COOLING UNOCCUPIED HOURS 72.0 (R)
	DESIRED MIXED AIR TEMPERATURE, °F 0.0 IF FIXED OA OR ZONE CONTROLLED 55.0 (R)	

ECONOMIZER TYPES



TYPE 1 – "DUMB"



TYPE 2 – "SMART"

ELEVATION IN FEET (R) 5840.0

DEBUG REPORT	1 = MONTHLY MIXED AIR REPORT BY BIN INCREMENT 2 = ANNUAL REPORT BY MONTH

PROJECT--FT CARSON UPDATE EEAP

BUILDING--P-2055
CASE--BASELINE
DATE--11/20/92
PREPARED BY--AJN

ZONE # 1
CASE #0

******************** BIN HEATING AND COOLING ********************
******************** LOADS REPORT ********************
******************** BUILDING BOUNDARY ********************

BIN F	HOURS 7-16	HOURS 17- 6	MECH HEATING LOADS 7 - 16 MBTU	MECH HEATING LOADS 17 - 6 MBTU	MECH COOLING LOADS 7 - 16 MBTU	MECH COOLING LOADS 17 - 6 MBTU
-25 to -20	0	0	.0000	.0000	.0000	.0000
-20 to -15	0	0	.0000	.0000	.0000	.0000
-15 to -10	0	0	.0000	.0000	.0000	.0000
-10 to -5	0	2	.0000	.1007	.0000	.0000
-5 to 0	0	8	.0000	.3757	.0000	.0000
0 to 5	15	94	.4875	4.0913	.0000	.0000
5 to 10	17	121	.4909	4.8744	.0000	.0000
10 to 15	37	168	.9362	6.2243	.0000	.0000
15 to 20	55	303	1.1932	10.2100	.0000	.0000
20 to 25	97	376	1.7577	11.4060	.0000	.0000
25 to 30	112	486	1.6054	13.0760	.0000	.0000
30 to 35	94	353	1.0085	8.3060	.0000	.0000
35 to 40	144	407	1.0187	8.1440	.0000	.0000
40 to 45	135	493	.4385	7.7602	.0000	.0000
45 to 50	181	594	.0069	7.0183	.0000	.0000
50 to 55	175	556	.0000	4.3211	.0000	.0000
55 to 60	178	563	.0000	2.1864	.0000	.0000
60 to 65	192	621	.0000	.0000	.0000	.0000
65 to 70	210	521	.0000	.0000	.0000	.0000
70 to 75	193	327	.0000	.0000	3.0122	1.4548
75 to 80	192	220	.0000	.0000	3.9081	1.7473
80 to 85	163	114	.0000	.0000	4.4666	1.3088
85 to 90	135	74	.0000	.0000	4.2606	1.1270
90 to 95	15	19	.0000	.0000	.5280	.3527
95 to 100	0	0	.0000	.0000	.0000	.0000
100 to 105	0	0	.0000	.0000	.0000	.0000
ANN	2340	6420	8.9435	88.0941	16.1755	5.9906

PROJECT--FT CARSON UPDATE EEAP

BUILDING--P-2055
CASE--BASELINE
DATE--11/20/92
PREPARED BY--AJN

ZONE # 1
CASE #0

******************** MONTHLY HEATING AND COOLING ********************
******************** LOADS REPORT ********************
******************** BUILDING BOUNDARY ********************

MONTH	MECH HEATING LOADS 7 - 16 MBTU	MECH HEATING LOADS 17 - 6 MBTU	MECH COOLING LOADS 7 - 16 MBTU	MECH COOLING LOADS 17 - 6 MBTU
01 JAN	2.2403	15.9270	.0000	.0000
02 FEB	2.0337	14.2660	.0000	.0000
03 MAR	1.1618	12.2380	.0000	.0000
04 APR	.3621	7.0492	.0000	.0000
05 MAY	.0214	4.2106	1.0158	.3521
06 JUN	.0000	.0000	2.5950	.6062
07 JUL	.0000	.0000	4.8587	2.7834
08 AUG	.0000	.0000	4.6110	1.3376
09 SEP	.0089	2.8582	3.0950	.9112
10 OCT	.0586	6.5823	.0000	.0000
11 NOV	1.7168	12.1200	.0000	.0000
12 DEC	1.3401	12.8430	.0000	.0000
ANN	8.9435	88.0941	16.1755	5.9906

Building Boundary Energy per Square
Foot of Total Building area = 57865.8 BTU

PROJECT--FT CARSON UPDATE EEAP

BUILDING--P-2055
CASE--BASELINE
DATE--11/20/92
PREPARED BY--AJN

ZONE # 1
CASE #0

******************** BIN SOLAR ENERGY REPORT ********************
******************** DIRECT GAIN THROUGH ********************
******************** WINDOWS AND SKYLIGHTS ********************

BIN F	HOURS 7-16	SOLAR DIRECT GAIN 7 - 16 MBTU
-25 to -20	0	.0000
-20 to -15	0	.0000
-15 to -10	0	.0000
-10 to -5	0	.0000
-5 to 0	0	.0000
0 to 5	15	.0444
5 to 10	17	.0556
10 to 15	37	.1326
15 to 20	55	.2142
20 to 25	97	.4078
25 to 30	112	.5056
30 to 35	94	.4535
35 to 40	144	.7395
40 to 45	135	.7351
45 to 50	181	1.0418
50 to 55	175	1.0616
55 to 60	178	1.1350
60 to 65	192	1.2838
65 to 70	210	1.4694
70 to 75	193	1.4103
75 to 80	192	1.4626
80 to 85	163	1.2922
85 to 90	135	1.1122
90 to 95	15	.1282
95 to 100	0	.0000
100 to 105	0	.0000
ANN	2340	14.6855

PROJECT--FT CARSON UPDATE EEAP

BUILDING--P-2055
CASE--BASELINE
DATE--11/20/92
PREPARED BY--AJN

ZONE # 1
CASE #0

******************* MONTHLY INTERNAL GAINS REPORT: *******************
******************* LOADS AND RAW SOURCE ENERGY *******************
******************* CONSUMPTION *******************

MONTH	LIGHTS ELEC MBTU	MISC ELEC MBTU	PEOPLE MBTU	APPLIANC ELEC MBTU
01 J	1.9934	.3808	.0964	3.2684
02 F	1.8615	.3595	.0918	2.9521
03 M	2.1116	.4109	.1056	3.2684
04 A	1.9692	.3787	.0964	3.1630
05 M	2.0525	.3959	.1010	3.2684
06 J	2.0283	.3937	.1010	3.1630
07 J	1.9934	.3808	.0964	3.2684
08 A	2.1116	.4109	.1056	3.2684
09 S	2.0283	.3937	.1010	3.1630
10 O	1.9934	.3808	.0964	3.2684
11 N	2.0283	.3937	.1010	3.1630
12 D	2.0525	.3959	.1010	3.2684
TOT	24.2241	4.6754	1.1934	38.4827
RAW SOURCE	82.3321	15.8905	1.1934	130.7937

PROJECT--FT CARSON UPDATE EEAP

BUILDING--P-2055
CASE--BASELINE
DATE--11/20/92
PREPARED BY--AJN

ALL ZONES
CASE #0

******************** MONTHLY HEATING AND COOLING ********************
******************** OUTSIDE AIR LOADS ********************
******************** BUILDING BOUNDARY ********************

MONTH	HEATING MBTU	COOLING MBTU
01 JAN	12.72550	.00000
02 FEB	11.84763	.00000
03 MAR	11.27862	.00000
04 APR	7.49994	.00000
05 MAY	4.71023	.04070
06 JUN	.00000	.14671
07 JUL	.00000	.54784
08 AUG	.00000	.31727
09 SEP	2.24236	.22740
10 OCT	4.40270	.00000
11 NOV	11.25570	.00000
12 DEC	11.22699	.00000
	----------	----------
ANN	77.18967	1.27993

PROJECT--FT CARSON UPDATE EEAP

BUILDING--P-2055
CASE--BASELINE
DATE--11/20/92
PREPARED BY--AJN

ALL ZONES
CASE #0

******************** MONTHLY HEATING AND COOLING ********************
******************** RAW SOURCE ENERGY ********************
******************** CONSUMPTION REPORT ********************

MONTH	TOTAL HEATING NAT GAS MBTU	TOTAL COOLING NAT GAS MBTU
01 J	48.9590	.0000
02 F	44.6070	.0000
03 M	39.1099	.0000
04 A	23.6310	.0000
05 M	14.1715	2.7037
06 J	.0000	6.4258
07 J	.0000	15.7197
08 A	.0000	12.0266
09 S	8.0973	8.1261
10 O	17.5016	.0000
11 N	39.7661	.0000
12 D	40.2695	.0000
ANN	276.1129	45.0019

BTU/SF/YR HEATING: 134035.4 COOLING: 21845.6

Raw Source Energy per Square
Foot of Total Building Area = 155881.0 BTU

BCEP INPUT FORM

EMC ENGINEERS, INC. DENVER, COLORADO

CASE TYPE NEW (1) EXISTING (2)	EXISTING INPUT FILE (XXXXXX.IN)		BIN CHART FOR THIS RUN (XBINXX.XX)
2	2055.I14	Only Changes Are Shown.	

PROJECT DESCRIPTION (20 CHAR)	CASE DESCRIPTION (20 CHAR)	CASE or ECM #	DATE (mm/dd/yy)
	NIGHT SETBACK	1	11/20/93

PREPARED BY: (6C)	BUILDING NAME: (6C)	TOTAL FLOOR AREA (R)	# OF ZONES (I)	ZONE NUMBER (I)	FAN SYSTEM Y N

HEATING	MONTH ON (00-12) (I)	MONTH OFF (01-12) (I)	DD CORR. FACTOR (R)	FUEL TYPE (I)	EQPT. CAPACITY (R)	# PART LOAD PTS 2 MIN 11 MAX

PART LOAD POINTS (R)	1	2	3	4	5	6	7	8	9	10	11	EFFICIENCY POINTS (R)	1	2	3	4	5	6	7	8	9	10	11

COOLING	MONTH ON (00-12) (I)	MONTH OFF (01-12) (I)	FUEL TYPE (I)	EQPT. CAPACITY (R)	# PART LOAD PTS. 2 MIN 11 MAX

PART LOAD POINTS	1	2	3	4	5	6	7	8	9	10	11	EFFICIENCY POINTS	1	2	3	4	5	6	7	8	9	10	11

BIN Nº HEATING BEGINS (I)	BIN Nº COOLING BEGINS (I)	HEAT NON-WORK HOURS ? Y N	COOL NON-WORK HOURS ? Y N

CONDUCTION	RUN THIS ZONE ? Y N		SOLAR RAD DISK FILE:

	WALLS NORTH	EAST	SOUTH	WEST	ROOF
AREA (R)					
U-VALUE (R)					
COLOR ADJUSTMENT FACTOR (R)					
CLTD (I)					
EXTERNAL SHADE FACTOR (R)					

ATTIC VENTILATION ? Y N	PERCENT POSSIBLE SUMMER SUNSHINE (R)	PERCENT POSSIBLE WINTER SUNSHINE (R)

	GLASS (VERTICAL) N	NE	E	SE	S	SW	W	NW	SKYLIGHT or ROOF GLASS
AREA (R)									
U-FACTOR (R)									
SHADING COEFFICIENT (R)									
COOLING LOAD FACTOR (R)									
MAX SHGF, SUMMER (I)									
MAX SHGF, WINTER (I)									
EXTERNAL SHADE FACTOR (R)									

FLOOR TYPE 0: NONE 1: PERIM. 2: CRAWL	(2) FLOOR AREA (R)	(2) FLOOR U-VALUE (R)	CRAWL SPACE TEMPERATURE (R) S W	EXPOSED PERIMETER LENGTH (R)

TEMP RANGE (I)		DESIGN DAY TEMPERATURE (R) S W	SPACE HEATING TEMPERATURE (R) D N	SPACE COOLING TEMPERATURE (R) D N

CONVECTION Y N	ELEVATION	AIR FLOW RATES—OCCUP / UNOCUP ACFM(R) ACFM(R)	HEATING AIR TEMP (R)	COOLING AIR TEMP (R)
			D 68.0 N 55.0	D 78.0 N 100.0

INTERNAL GAINS	RUN THIS ZONE ? Y N	Nº of TYPES ? (I)	INTERNAL GAINS TYPES DHW (1)	LIGHTS (2)	APPLIANCES (3)	MISC. (4)	PEOPLE (5)
DAY:	FUEL TYPE	(I)					X
	BTUH / UNIT	(R)					
	NUMBER OF UNITS	(I)					
	SPACE LOAD FACTOR	(R)					
	SCHEDULE CORRECTION FACTOR	(R)					
NIGHT:	BTUH / UNIT	(R)					
	NUMBER OF UNITS	(I)					
	SPACE LOAD FACTOR	(R)					
	SCHEDULE CORRECTION FACTOR	(R)					
	EFFICIENCY	(R)					X

INPUT FILE (XXXXXX.IN) 2055.I14 OUTPUT FILE (XXXXXX.RPT) 2055.R14

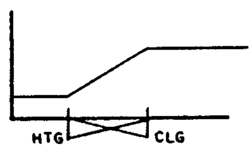
VBCEP INPUT FORM

EMC ENGINEERS, INC. DENVER, COLORADO

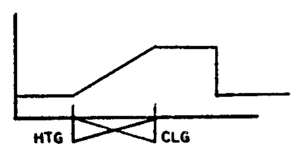
BUILDING NUMBER
P-2055

SUPPLY AIR (ACFM)	OCCUPIED HOURS: (R)	UNOCCUPIED HOURS: (R)
MAX OA/SA RATIO	OCCUPIED HOURS: (R)	UNOCCUPIED HOURS: (R)
MIN OA/SA RATIO	OCCUPIED HOURS: (R)	UNOCCUPIED HOURS: (R)
APPROXIMATE RETURN AIR TEMP, °F	HEATING OCCUPIED HOURS 68.0 (R)	HEATING UNOCCUPIED HOURS 55.0 (R)
	COOLING OCCUPIED HOURS 78.0 (R)	COOLING UNOCCUPIED HOURS 120.0 (R)
	DESIRED MIXED AIR TEMPERATURE, °F 0.0 IF FIXED OA OR ZONE CONTROLLED (R)	

ECONOMIZER TYPES



TYPE 1 – "DUMB"



TYPE 2 – "SMART"

ELEVATION IN FEET (R)

DEBUG REPORT	1 = MONTHLY MIXED AIR REPORT BY BIN INCREMENT 2 = ANNUAL REPORT BY MONTH

PROJECT--FT CARSON UPDATE EEAP

BUILDING--P-2055 ZONE # 1
CASE--ECO #14 - NIGHT SETBACK CASE #1
DATE--11/20/92
PREPARED BY--AJN

******************* BIN HEATING AND COOLING *******************
******************* LOADS REPORT *******************
******************* BUILDING BOUNDARY *******************

BIN F	HOURS 7-16	17- 6	MECH HEATING LOADS 7 - 16 MBTU	17 - 6 MBTU	MECH COOLING LOADS 7 - 16 MBTU	17 - 6 MBTU
-25 to -20	0	0	.0000	.0000	.0000	.0000
-20 to -15	0	0	.0000	.0000	.0000	.0000
-15 to -10	0	0	.0000	.0000	.0000	.0000
-10 to -5	0	2	.0000	.0780	.0000	.0000
-5 to 0	0	8	.0000	.2851	.0000	.0000
0 to 5	15	94	.4475	3.0262	.0000	.0000
5 to 10	17	121	.4456	3.5034	.0000	.0000
10 to 15	37	168	.8375	4.3208	.0000	.0000
15 to 20	55	303	1.0466	6.7769	.0000	.0000
20 to 25	97	376	1.4991	7.1463	.0000	.0000
25 to 30	112	486	1.3068	7.5692	.0000	.0000
30 to 35	94	353	.7579	4.3065	.0000	.0000
35 to 40	144	407	.6348	3.5667	.0000	.0000
40 to 45	135	493	.0821	2.4691	.0000	.0000
45 to 50	181	594	.0000	1.0133	.0000	.0000
50 to 55	175	556	.0000	.0000	.0000	.0000
55 to 60	178	563	.0000	.0000	.0000	.0000
60 to 65	192	621	.0000	.0000	.0000	.0000
65 to 70	210	521	.0000	.0000	.0000	.0000
70 to 75	193	327	.0000	.0000	2.4453	.0000
75 to 80	192	220	.0000	.0000	3.2830	.0000
80 to 85	163	114	.0000	.0000	3.8454	.0166
85 to 90	135	74	.0000	.0000	3.7363	.2578
90 to 95	15	19	.0000	.0000	.4698	.1295
95 to 100	0	0	.0000	.0000	.0000	.0000
100 to 105	0	0	.0000	.0000	.0000	.0000
ANN	2340	6420	7.0580	44.0616	13.7798	.4039

PROJECT--FT CARSON UPDATE EEAP

BUILDING--P-2055 ZONE # 1
CASE--ECO #14 - NIGHT SETBACK CASE #1
DATE--11/20/92
PREPARED BY--AJN

******************** MONTHLY HEATING AND COOLING ********************
******************** LOADS REPORT ********************
******************** BUILDING BOUNDARY ********************

MONTH	MECH HEATING LOADS		MECH COOLING LOADS	
	7 - 16	17 - 6	7 - 16	17 - 6
	MBTU	MBTU	MBTU	MBTU
01 JAN	1.8054	9.6462	.0000	.0000
02 FEB	1.6791	8.7179	.0000	.0000
03 MAR	.9112	6.4869	.0000	.0000
04 APR	.2123	2.5727	.0000	.0000
05 MAY	.0067	.6087	.8411	.0002
06 JUN	.0000	.0000	2.1950	.0260
07 JUL	.0000	.0000	4.1753	.3014
08 AUG	.0000	.0000	3.9276	.0529
09 SEP	.0009	.3440	2.6407	.0235
10 OCT	.0319	2.0616	.0000	.0000
11 NOV	1.3695	6.5307	.0000	.0000
12 DEC	1.0411	7.0929	.0000	.0000
ANN	7.0580	44.0616	13.7798	.4039

Building Boundary Energy per Square
Foot of Total Building area = 31700.6 BTU

PROJECT--FT CARSON UPDATE EEAP

BUILDING--P-2055 ZONE # 1
CASE--ECO #14 - NIGHT SETBACK CASE #1
DATE--11/20/92
PREPARED BY--AJN

******************* BIN SOLAR ENERGY REPORT *******************
******************* DIRECT GAIN THROUGH *******************
******************* WINDOWS AND SKYLIGHTS *******************

BIN F	HOURS 7-16	SOLAR DIRECT GAIN 7 - 16 MBTU
-25 to -20	0	.0000
-20 to -15	0	.0000
-15 to -10	0	.0000
-10 to -5	0	.0000
-5 to 0	0	.0000
0 to 5	15	.0444
5 to 10	17	.0556
10 to 15	37	.1326
15 to 20	55	.2142
20 to 25	97	.4078
25 to 30	112	.5056
30 to 35	94	.4535
35 to 40	144	.7395
40 to 45	135	.7351
45 to 50	181	1.0418
50 to 55	175	1.0616
55 to 60	178	1.1350
60 to 65	192	1.2838
65 to 70	210	1.4694
70 to 75	193	1.4103
75 to 80	192	1.4626
80 to 85	163	1.2922
85 to 90	135	1.1122
90 to 95	15	.1282
95 to 100	0	.0000
100 to 105	0	.0000
ANN	2340	14.6855

PROJECT--FT CARSON UPDATE EEAP

BUILDING--P-2055 ZONE # 1
CASE--ECO #14 - NIGHT SETBACK CASE #1
DATE--11/20/92
PREPARED BY--AJN

****************** MONTHLY INTERNAL GAINS REPORT: ******************
****************** LOADS AND RAW SOURCE ENERGY ******************
****************** CONSUMPTION ******************

MONTH	LIGHTS ELEC MBTU	MISC ELEC MBTU	PEOPLE MBTU	APPLIANC ELEC MBTU
01 J	1.9934	.3808	.0964	3.2684
02 F	1.8615	.3595	.0918	2.9521
03 M	2.1116	.4109	.1056	3.2684
04 A	1.9692	.3787	.0964	3.1630
05 M	2.0525	.3959	.1010	3.2684
06 J	2.0283	.3937	.1010	3.1630
07 J	1.9934	.3808	.0964	3.2684
08 A	2.1116	.4109	.1056	3.2684
09 S	2.0283	.3937	.1010	3.1630
10 O	1.9934	.3808	.0964	3.2684
11 N	2.0283	.3937	.1010	3.1630
12 D	2.0525	.3959	.1010	3.2684
TOT	24.2241	4.6754	1.1934	38.4827
RAW SOURCE	82.3321	15.8905	1.1934	130.7937

PROJECT--FT CARSON UPDATE EEAP

BUILDING--P-2055 ALL ZONES
CASE--ECO #14 - NIGHT SETBACK7 CASE #1
DATE--11/20/92
PREPARED BY--AJN

******************** MONTHLY HEATING AND COOLING ********************
******************** OUTSIDE AIR LOADS ********************
******************** BUILDING BOUNDARY ********************

MONTH	HEATING MBTU	COOLING MBTU
01 JAN	16.25033	.00000
02 FEB	15.04990	.00000
03 MAR	13.13235	.00000
04 APR	7.48661	.00000
05 MAY	3.95883	.41637
06 JUN	.00000	.79845
07 JUL	.00000	.86842
08 AUG	.00000	.83901
09 SEP	1.76908	.82758
10 OCT	4.63137	.00000
11 NOV	12.93012	.00000
12 DEC	13.25437	.00000
	----------	----------
ANN	88.46296	3.74983

PROJECT--FT CARSON UPDATE EEAP

BUILDING--P-2055 ALL ZONES
CASE--ECO #14 - NIGHT SETBACK CASE #1
DATE--11/20/92
PREPARED BY--AJN

******************** MONTHLY HEATING AND COOLING ********************
******************** RAW SOURCE ENERGY ********************
******************** CONSUMPTION REPORT ********************

MONTH	TOTAL HEATING NAT GAS MBTU	TOTAL COOLING NAT GAS MBTU
01 J	43.9015	.0000
02 F	40.3278	.0000
03 M	32.5364	.0000
04 A	16.2783	.0000
05 M	7.2491	2.4139
06 J	.0000	5.7956
07 J	.0000	10.2594
08 A	.0000	9.2504
09 S	3.3502	6.7021
10 O	10.6574	.0000
11 N	33.0116	.0000
12 D	33.8959	.0000
ANN	221.2083	34.4214
BTU/SF/YR	HEATING: 107382.7	COOLING: 16709.4

Raw Source Energy per Square
Foot of Total Building Area = 124092.1 BTU

TAB C-3

FORT CARSON ECONOMIZER CYCLES
ECO #16

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION: FORT CARSON, COLORADO	REGION: 4	PROJECT NO:	
PROJECT TITLE: FT CARSON EEAP UPDATE		FISCAL YEAR:	1992
DISCRETE PORTION NAME: ECO #16 - ECONOMIZER CYCLE		BUILDING:	P-1850
ANALYSIS DATE: 06/24/93	ECONOMIC LIFE: 20	PREPARED BY:	A. NIEMEYER

1 INVESTMENT COSTS

A.	CONSTRUCTION COST	=	$5,180	
B.	SIOH COST	(5.5% of 1A) =	$285	
C.	DESIGN COST	(6.0% of 1A) =	$311	
D.	TOTAL COST	(1A + 1B + 1C) =	$5,776	
E.	SALVAGE VALUE	=	$0	
F.	SALVAGE VALUE OF EXISTING EQUIP.	=	$0	
G.	TOTAL INVESTMENT	(1D - 1E - 1F) =	---------->	$5,776

2 ENERGY SAVINGS (+) or COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS: OCTOBER 1992

	ENERGY SOURCE	COST $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A.	ELEC	$7.32		$0	14.53	$0	
B.	DIST			$0	17.63	$0	
C.	NAT GAS	$3.48	223.06	$775	18.59	$14,414	
D.	COAL			$0	14.46	$0	
E.	SOLAR			$0		$0	
F.	DEMAND SAVINGS	$69.68 / year		$0	13.59	$0	
G.	TOTAL		223.06	775.4		---------->	$14,414

3 NONENERGY SAVINGS (+) or COST (-)

A.	ANNUAL RECURRING			$0	
	1 DISCOUNT FACTOR	(From Table A-2) =	13.59		
	2 DISCOUNTED SAVINGS or COST	(3A x 3A1) =		$0	

B. NONRECURRING

ITEM	SAVINGS or COST (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3)	DISCOUNTED SVGS or COST (4)
a.	$0	0	0.00	$0
b.	$0	0	0.00	$0
c.	$0	0	0.00	$0
d TOTAL	$0			$0

C. TOTAL NONENERGY DISCOUNTED SAVINGS or COST (3A2 + 3Bd4) = $0

4 SIMPLE PAYBACK (SPB) - (YRS)	1G/(2G3 + 3A + (3Bd1/20)) =	7.4
5 TOTAL NET DISCOUNTED SAVINGS	(2G5 + 3C) =	$14,414
6 SAVINGS-TO-INVESTMENT RATIO (SIR)	(5/1G) =	2.50
7 ADJUSTED INTERNAL RATE OF RETURN (AIRR) - (%)	[(1+.04) x SIR to 1/20 power - 1] x 100 =	8.87

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION:	FORT CARSON, COLORADO	REGION:	4	PROJECT NO:	
PROJECT TITLE:	FT CARSON EEAP UPDATE			FISCAL YEAR:	1992
DISCRETE PORTION NAME:	ECO #16 - ECONOMIZER CYCLE			BUILDING:	P-2359
ANALYSIS DATE:	06/24/93	ECONOMIC LIFE: 20		PREPARED BY:	A. NIEMEYER

1 INVESTMENT COSTS

A. CONSTRUCTION COST	=	$2,620		
B. SIOH COST	(5.5% of 1A) =	$144		
C. DESIGN COST	(6.0% of 1A) =	$157		
D. TOTAL COST	(1A + 1B + 1C) =	$2,921		
E. SALVAGE VALUE	=	$0		
F. SALVAGE VALUE OF EXISTING EQUIP.	=	$0		
G. TOTAL INVESTMENT	(1D - 1E - 1F) =	--------->	$2,921	

2 ENERGY SAVINGS (+) or COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS: OCTOBER 1992

ENERGY SOURCE	COST $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A. ELEC	$7.32		$0	14.53	$0	
B. DIST			$0	17.63	$0	
C. NAT GAS	$3.48	84.70	$294	18.59	$5,473	
D. COAL			$0	14.46	$0	
E. SOLAR			$0		$0	
F. DEMAND SAVINGS	$69.68 / year		$0	13.59	$0	
G. TOTAL		84.70	$294		---------->	$5,473

3 NONENERGY SAVINGS (+) or COST (-)

A. ANNUAL RECURRING			$0
1 DISCOUNT FACTOR	(From Table A-2) =	13.59	
2 DISCOUNTED SAVINGS or COST	(3A x 3A1) =		$0

B. NONRECURRING

ITEM	SAVINGS or COST (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3)	DISCOUNTED SVGS or COST (4)
a.	$0	0	0.00	$0
b.	$0	0	0.00	$0
c.	$0	0	0.00	$0
d TOTAL	$0			$0

C. TOTAL NONENERGY DISCOUNTED SAVINGS or COST (3A2 + 3Bd4) = $0

4 SIMPLE PAYBACK (SPB) - (YRS)	1G/(2G3 + 3A + (3Bd1/20)) =	9.9
5 TOTAL NET DISCOUNTED SAVINGS	(2G5 + 3C) =	$5,473
6 SAVINGS-TO-INVESTMENT RATIO (SIR)	(5/1G) =	1.87
7 ADJUSTED INTERNAL RATE OF RETURN (AIRR) - (%)	[(1+.04) x SIR to 1/20 power - 1] x 100 =	7.32

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION: FORT CARSON, COLORADO	REGION: 4	PROJECT NO:	
PROJECT TITLE: FT CARSON EEAP UPDATE		FISCAL YEAR:	1992
DISCRETE PORTION NAME: ECO #16 - ECONOMIZER CYCLE		BUILDING:	ALL BUILDINGS
ANALYSIS DATE: 06/30/93	ECONOMIC LIFE: 20	PREPARED BY:	A. NIEMEYER

1 INVESTMENT COSTS

A.	CONSTRUCTION COST	=	$7,800	
B.	SIOH COST	(5.5% of 1A) =	$429	
C.	DESIGN COST	(6.0% of 1A) =	$468	
D.	TOTAL COST	(1A + 1B + 1C) =	$8,697	
E.	SALVAGE VALUE	=	$0	
F.	SALVAGE VALUE OF EXISTING EQUIP.	=	$0	
G.	TOTAL INVESTMENT	(1D - 1E - 1F) =	--------->	$8,697

2 ENERGY SAVINGS (+) or COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS: OCTOBER 1992

	ENERGY SOURCE	COST $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A.	ELEC	$7.32		$0	14.53	$0	
B.	DIST			$0	17.63	$0	
C.	NAT GAS	$3.48	307.76	$1,070	18.59	$19,887	
D.	COAL			$0	14.46	$0	
E.	SOLAR			$0		$0	
F.	DEMAND SAVINGS	$69.68 / year		$0	13.59	$0	
G.	TOTAL		307.76	1,069.8		--------->	$19,887

3 NONENERGY SAVINGS (+) or COST (-)

A. ANNUAL RECURRING			$0	
1 DISCOUNT FACTOR	(From Table A-2) =	13.59		
2 DISCOUNTED SAVINGS or COST	(3A x 3A1) =		$0	

B. NONRECURRING

ITEM	SAVINGS or COST (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3)	DISCOUNTED SVGS or COST (4)
a.	$0	0	0.00	$0
b.	$0	0	0.00	$0
c.	$0	0	0.00	$0
d TOTAL	$0			$0

C. TOTAL NONENERGY DISCOUNTED SAVINGS or COST (3A2 + 3Bd4) = $0

4 SIMPLE PAYBACK (SPB) - (YRS)	1G/(2G3 + 3A + (3Bd1/20)) =	8.1
5 TOTAL NET DISCOUNTED SAVINGS	(2G5 + 3C) =	$19,887
6 SAVINGS-TO-INVESTMENT RATIO (SIR)	(5/1G) =	2.29
7 ADJUSTED INTERNAL RATE OF RETURN (AIRR) - (%)	[(1+.04) x SIR to 1/20 power - 1] x 100 =	8.39

CONSTRUCTION COST ESTIMATE	DATE PREPARED 24-Jun-93	SHEET 1 OF 1

Project UPDATE EXISTING EEAP	BASIS FOR ESTIMATE
Location FORT CARSON, COLORADO	X Code A (No design completed) __ Code B (Preliminary design) __ Code C (Final design) __ Other (Specify)____
Architect-Engineer E M C ENGINEERS, INC., 2750 S. WADSWORTH BLVD., DENVER, CO 80227	

Drawing No.	Estimator A. NIEMEYER	Checked by T. FORSTER

ECO #16 Economizer Cycle	Quantity No. Units	 Unit Meas.	Labor Per Unit	 Total	Material Per Unit	 Total	Total Cost
BLDG P-1850 (AHU-1 - Sanctuary)							
Mixed Air Sensor	1	EA	13.85	13.85	138.32	138.32	$152.17
Economizer Logic Controller	1	EA	82.66	82.66	300.85	300.85	$383.51
Exhaust Air Damper (36"X48")	1	EA	91.24	91.24	288.50	288.50	$379.74
Wall Demolition for Exhaust Louver	1	EA	182.49	182.49			$182.49
Exhaust Air Louver (72" x 80")	1	EA	169.97	169.97	378.25	378.25	$548.22
Ductwork (36" x 48") - 15'	1	EA	891.83	891.83	650.45	650.45	$1,542.28
Electric Accuators	3	EA	16.53	49.60	83.98	251.94	$301.54
O.A. Temperature Transmitter	1	EA	13.85	13.85	138.32	138.32	$152.17
Note: Intake Air Louver appears to be properly sized for 100% O.A.							
Subtotal - Direct Costs per Installation				**370.24**		**727.66**	**3642.11**
Overhead, Bond, Ins. (16.8%)							$611.87
Workers Comp. Ins. (7.3%)							$27.03
Profit (10%)							$428.10
Contingency (10%)							$470.91
TOTAL							**$5,180.02**
BLDG P-2359 (AHU-2 - Office Area)							
Mixed Air Sensor	1	EA	13.85	13.85	138.32	138.32	$152.17
Economizer Logic Controller (Pneumatic)	1	EA	82.66	82.66	300.85	300.85	$383.51
Ductwork Demolition	1	EA	41.33	41.33			$41.33
Ductwork (24" x 28") - 8'	1	EA	185.99	185.99	134.57	134.57	$320.56
Outside Air Damper (24"x28")	1	EA	27.55	27.55	54.59	54.59	$82.13
Exhaust Air Damper (24"x28")	1	EA	27.55	27.55	54.59	54.59	$82.13
Wall Demolition for Intake Louver	1	EA	91.24	91.24			$91.24
Intake Air Louver (36" x 40")	1	EA	84.99	84.99	123.25	123.25	$208.24
O.A. Temperature Transmitter	1	EA	13.85	13.85	138.32	138.32	$152.17
Electric Accuators	3	EA	16.53	49.60	83.98	251.94	$301.54
Subtotal - Direct Costs per Installation				**618.60**		**1196.42**	**1815.02**
Overhead, Bond, Ins. (16.8%)							$304.92
Workers Comp. Ins. (7.3%)							$45.16
Profit (10%)							$216.51
Contingency (10%)							$238.16
TOTAL							**$2,619.77**
TOTAL FOR ECO #16							**$7,799.79**

ENG FORM 150
1 AUG 59

PREVIOUS EDITION MAY BE USED

*U.S. GOVERNMENT PRINTING OFFICE 1959 0-516148

BCEP INPUT FORM

EMC ENGINEERS, INC. DENVER, COLORADO

CASE TYPE NEW (1) EXISTING (2)	EXISTING INPUT FILE (XXXXXX.IN)	BIN CHART FOR THIS RUN (XBINXX.XX)
(2)	1850B.IN	FCBIN.4

PROJECT DESCRIPTION (20 CHAR)	CASE DESCRIPTION (20 CHAR)	CASE or ECM #	DATE (mm/dd/yy)
FT CARSON UPDATE EEAP	BASELINE	Ø	4/13/93

PREPARED BY: (6C)	BUILDING NAME: (6C)	TOTAL FLOOR AREA (R)	# OF ZONES (I)	ZONE NUMBER (I)	FAN SYSTEM Y N
AJN	P-1850B	5217.0	1	1	Y

HEATING	MONTH ON (00-12) (I)	MONTH OFF (01-12) (I)	DD CORR. FACTOR (R)	FUEL TYPE (I)	EQPT. CAPACITY (R)	# PART LOAD PTS 2 MIN 11 MAX
	9	5	1.0	3	1,000,000	2

PART LOAD POINTS (R)	1	2	3	4	5	6	7	8	9	10	11
	0.1	1.0									

EFFICIENCY POINTS (R)	1	2	3	4	5	6	7	8	9	10	11
	0.63	0.63									

COOLING	MONTH ON (00-12) (I)	MONTH OFF (01-12) (I)	FUEL TYPE (I)	EQPT. CAPACITY (R)	# PART LOAD PTS. 2 MIN 11 MAX
	5	9	3	1,000,000	2

PART LOAD POINTS	1	2	3	4	5	6	7	8	9	10	11
	0.1	1.0									

EFFICIENCY POINTS	1	2	3	4	5	6	7	8	9	10	11
	.52	.52									

BIN Nº HEATING BEGINS (I)	BIN Nº COOLING BEGINS (I)	HEAT NON-WORK HOURS ? Y N	COOL NON-WORK HOURS ? Y N
17	20	Y	N

CONDUCTION	RUN THIS ZONE ? Y N	SOLAR RAD DISK FILE:
	Y	SOLAR.NE

WALLS	NORTH	EAST	SOUTH	WEST	ROOF
AREA (R)	796.0	1713.0	884.0	1127.6	5722.0
U-VALUE (R)	0.129	0.129	0.129	0.129	0.09
COLOR ADJUSTMENT FACTOR (R)	0.83	0.83	0.83	0.83	0.65
CLTD (I)	410	495	491	406	702
EXTERNAL SHADE FACTOR (R)	0.9	1.0	1.0	0.05	0.9

ATTIC VENTILATION ? Y N	PERCENT POSSIBLE SUMMER SUNSHINE (R)	PERCENT POSSIBLE WINTER SUNSHINE (R)
Y	67.0	66.0

GLASS (VERTICAL)	N	NE	E	SE	S	SW	W	NW	SKYLIGHT or ROOF GLASS
AREA (R)		88.0							63.0
U-FACTOR (R)		0.568							0.568
SHADING COEFFICIENT (R)		0.88							0.88
COOLING LOAD FACTOR (R)		5.2							8.23
MAX SHGF, SUMMER (I)		163							262
MAX SHGF, WINTER (I)		20							133
EXTERNAL SHADE FACTOR (R)		0.0							1.0

FLOOR TYPE 0: NONE 1: PERIM 2: CRAWL	(2) FLOOR AREA (R)	(2) FLOOR U-VALUE (R)	CRAWL SPACE TEMPERATURE S	W (R)	EXPOSED PERIMETER LENGTH (R)
1	—	0.36	—	—	217.0

TEMP RANGE (I)	DESIGN DAY TEMPERATURE (R) S	W	SPACE HEATING TEMPERATURE (R) D	N	SPACE COOLING TEMPERATURE (R) D	N
30	91.0	-3.0	60.0	60.0	75.0	0.0

CONVECTION Y N	ELEVATION	AIR FLOW RATES-OCCUP/UNOCUP ACFM(R)	ACFM(R)	HEATING AIR TEMP (R) D	N	COOLING AIR TEMP (R) D	N
N	5840	0.0	0.0	0.0	0.0	0.0	0.0

INTERNAL GAINS	RUN THIS ZONE ? Y N	Nº of TYPES ? (I)	DHW (1)	LIGHTS (2)	APPLIANCES (3)	MISC. (4)	PEOPLE (5)
	FUEL TYPE	(I)	1	1	1	1	
DAY:	BTUH/UNIT	(R)	1276.0	25290.0	30034.0	12735.0	255.0
	NUMBER OF UNITS	(I)	1	1	1	1	11
	SPACE LOAD FACTOR	(R)	0.01	0.5	0.5	0.0	1.0
	SCHEDULE CORRECTION FACTOR	(R)	1.0	0.33	0.024	0.353	1.0
NIGHT:	BTUH/UNIT	(R)	1276.0	25290.0	30034.0	12735.0	255.0
	NUMBER OF UNITS	(I)	1	1	1	1	1
	SPACE LOAD FACTOR	(R)	0.01	0.5	0.5	0.0	1.0
	SCHEDULE CORRECTION FACTOR	(R)	0.0	0.1	0.024	0.391	0.0
	EFFICIENCY	(R)	100.0	100.0	100.0	100.0	

INPUT FILE (XXXXXX.IN) 1850B.IN OUTPUT FILE (XXXXXX.RPT) 1850B.RPT

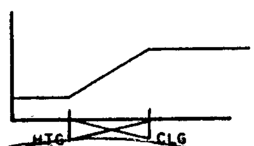
VBCEP INPUT FORM

EMC ENGINEERS, INC. DENVER, COLORADO

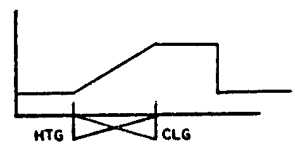
BUILDING NUMBER
P-1850B

SUPPLY AIR (ACFM)	OCCUPIED HOURS: 6255.0 (R)	UNOCCUPIED HOURS: 6255.0 (R)
MAX OA/SA RATIO	OCCUPIED HOURS: 0.15 (R)	UNOCCUPIED HOURS: 0.15 (R)
MIN OA/SA RATIO	OCCUPIED HOURS: 0.15 (R)	UNOCCUPIED HOURS: 0.15 (R)
APPROXIMATE RETURN AIR TEMP, °F	HEATING OCCUPIED HOURS 60.0 (R)	HEATING UNOCCUPIED HOURS 60.0 (R)
	COOLING OCCUPIED HOURS 75.0 (R)	COOLING UNOCCUPIED HOURS 75.0 (R)
	DESIRED MIXED AIR TEMPERATURE, °F 0.0 IF FIXED OA OR ZONE CONTROLLED 0.0 (R)	

ECONOMIZER TYPES



TYPE 1 - "DUMB"



TYPE 2 - "SMART"

ELEVATION IN FEET (R) 5840.

DEBUG REPORT	1 = MONTHLY MIXED AIR REPORT BY BIN INCREMENT 2 = ANNUAL REPORT BY MONTH

PROJECT--FT CARSON UPDATE EEAP

BUILDING--1850B
CASE--BASELINE
DATE--4/13/93
PREPARED BY--AJN

ZONE # 1
CASE #0

******************* BIN HEATING AND COOLING *******************
******************* LOADS REPORT *******************
******************* BUILDING BOUNDARY *******************

BIN F	HOURS 7-17	HOURS 18- 6	MECH HEATING LOADS 7 - 17 MBTU	MECH HEATING LOADS 18 - 6 MBTU	MECH COOLING LOADS 7 - 17 MBTU	MECH COOLING LOADS 18 - 6 MBTU
-25 to -20	0	0	.0000	.0000	.0000	.0000
-20 to -15	0	0	.0000	.0000	.0000	.0000
-15 to -10	0	0	.0000	.0000	.0000	.0000
-10 to -5	0	2	.0000	.1524	.0000	.0000
-5 to 0	0	8	.0000	.5580	.0000	.0000
0 to 5	19	90	1.0331	5.6818	.0000	.0000
5 to 10	28	110	1.3373	6.2868	.0000	.0000
10 to 15	52	153	2.1514	7.8277	.0000	.0000
15 to 20	85	273	2.9664	12.2230	.0000	.0000
20 to 25	160	313	4.5488	12.0270	.0000	.0000
25 to 30	183	415	3.9844	13.1700	.0000	.0000
30 to 35	155	292	2.3598	7.3785	.0000	.0000
35 to 40	213	338	1.7991	6.3537	.0000	.0000
40 to 45	213	415	.3308	4.7283	.0000	.0000
45 to 50	266	509	.0000	2.5183	.0000	.0000
50 to 55	274	457	.0000	.0459	.0000	.0000
55 to 60	271	470	.0000	.0000	.0000	.0000
60 to 65	302	511	.0000	.0000	.0000	.0000
65 to 70	359	372	.0000	.0000	.0000	.0000
70 to 75	318	202	.0000	.0000	7.8788	.0000
75 to 80	311	101	.0000	.0000	10.4600	.0000
80 to 85	227	50	.0000	.0000	10.0260	.0000
85 to 90	182	27	.0000	.0000	9.3773	.0000
90 to 95	32	2	.0000	.0000	1.8392	.0000
95 to 100	0	0	.0000	.0000	.0000	.0000
100 to 105	0	0	.0000	.0000	.0000	.0000
ANN	3650	5110	20.5109	78.9515	39.5813	.0000

PROJECT--FT CARSON UPDATE EEAP

BUILDING--1850B
CASE--BASELINE
DATE--4/13/93
PREPARED BY--AJN

ZONE # 1
CASE #0

******************** MONTHLY HEATING AND COOLING ********************
******************** LOADS REPORT ********************
******************** BUILDING BOUNDARY ********************

MONTH	MECH HEATING LOADS 7 - 17 MBTU	MECH HEATING LOADS 18 - 6 MBTU	MECH COOLING LOADS 7 - 17 MBTU	MECH COOLING LOADS 18 - 6 MBTU
01 JAN	5.1888	16.7490	.0000	.0000
02 FEB	4.8721	14.8820	.0000	.0000
03 MAR	3.0119	11.0930	.0000	.0000
04 APR	.4475	5.1263	.0000	.0000
05 MAY	.0120	1.5139	2.9435	.0000
06 JUN	.0000	.0000	5.5254	.0000
07 JUL	.0000	.0000	13.1410	.0000
08 AUG	.0000	.0000	10.6770	.0000
09 SEP	.0082	.7263	7.2949	.0000
10 OCT	.3084	4.0165	.0000	.0000
11 NOV	3.4525	12.0830	.0000	.0000
12 DEC	3.2095	12.7610	.0000	.0000
ANN	20.5109	78.9515	39.5813	.0000

Building Boundary Energy per Square
Foot of Total Building area = 26652.0 BTU

PROJECT--FT CARSON UPDATE EEAP

BUILDING--1850B
CASE--BASELINE
DATE--4/13/93
PREPARED BY--AJN

ZONE # 1
CASE #0

******************** BIN SOLAR ENERGY REPORT ********************
******************** DIRECT GAIN THROUGH ********************
******************** WINDOWS AND SKYLIGHTS ********************

BIN F	HOURS 7-17	SOLAR DIRECT GAIN 7 - 17 MBTU
-25 to -20	0	.0000
-20 to -15	0	.0000
-15 to -10	0	.0000
-10 to -5	0	.0000
-5 to 0	0	.0000
0 to 5	19	.0589
5 to 10	28	.0948
10 to 15	52	.1908
15 to 20	85	.3361
20 to 25	160	.6781
25 to 30	183	.8276
30 to 35	155	.7451
35 to 40	213	1.0845
40 to 45	213	1.1451
45 to 50	266	1.5056
50 to 55	274	1.6288
55 to 60	271	1.6881
60 to 65	302	1.9670
65 to 70	359	2.4404
70 to 75	318	2.2521
75 to 80	311	2.2910
80 to 85	227	1.7368
85 to 90	182	1.4442
90 to 95	32	.2630
95 to 100	0	.0000
100 to 105	0	.0000
ANN	3650	22.3781

PROJECT--FT CARSON UPDATE EEAP

BUILDING--1850B
CASE--BASELINE
DATE--4/13/93
PREPARED BY--AJN

ZONE # 1
CASE #0

******************* MONTHLY INTERNAL GAINS REPORT: *******************
******************* LOADS AND RAW SOURCE ENERGY *******************
******************* CONSUMPTION *******************

MONTH	DHW ELEC MBTU	LIGHTS ELEC MBTU	APPLIANC ELEC MBTU	MISC ELEC MBTU	PEOPLE MBTU
01 J	.3956	3.6848	.5363	3.5546	.8695
02 F	.3573	3.3282	.4844	3.2106	.7854
03 M	.3956	3.6848	.5363	3.5546	.8695
04 A	.3828	3.5659	.5190	3.4400	.8415
05 M	.3956	3.6848	.5363	3.5546	.8695
06 J	.3828	3.5659	.5190	3.4400	.8415
07 J	.3956	3.6848	.5363	3.5546	.8695
08 A	.3956	3.6848	.5363	3.5546	.8695
09 S	.3828	3.5659	.5190	3.4400	.8415
10 O	.3956	3.6848	.5363	3.5546	.8695
11 N	.3828	3.5659	.5190	3.4400	.8415
12 D	.3956	3.6848	.5363	3.5546	.8695
TOT	4.6578	43.3850	6.3143	41.8531	10.2382
RAW SOURCE	15.8307	147.4556	21.4610	142.2489	10.2382

PROJECT--FT CARSON UPDATE EEAP

BUILDING--1850B
CASE--BASELINE
DATE--4/13/93
PREPARED BY--AJN

ALL ZONES
CASE #0

******************** MONTHLY HEATING AND COOLING ********************
******************** OUTSIDE AIR LOADS ********************
******************** BUILDING BOUNDARY ********************

MONTH	HEATING MBTU	COOLING MBTU
01 JAN	20.25799	.00000
02 FEB	18.45627	.00000
03 MAR	14.83027	.00000
04 APR	7.75475	.00000
05 MAY	3.78196	.10671
06 JUN	.00000	.56227
07 JUL	.00000	2.30242
08 AUG	.00000	1.26818
09 SEP	2.09311	.91933
10 OCT	5.83402	.00000
11 NOV	15.08473	.00000
12 DEC	15.29199	.00000
	----------	----------
ANN	103.38510	5.15889

PROJECT--FT CARSON UPDATE EEAP

BUILDING--1850B
CASE--BASELINE
DATE--4/13/93
PREPARED BY--AJN

ALL ZONES
CASE #0

******************** MONTHLY HEATING AND COOLING ********************
******************** RAW SOURCE ENERGY ********************
******************** CONSUMPTION REPORT ********************

MONTH	TOTAL HEATING NAT GAS MBTU	TOTAL COOLING NAT GAS MBTU
01 J	66.8716	.0000
02 F	60.5551	.0000
03 M	45.8568	.0000
04 A	21.1228	.0000
05 M	8.4118	5.8545
06 J	.0000	11.6846
07 J	.0000	29.6413
08 A	.0000	22.9270
09 S	4.4813	15.7663
10 O	16.0997	.0000
11 N	48.5265	.0000
12 D	49.5442	.0000
ANN	321.4698	85.8737

BTU/SF/YR HEATING: 61619.7 COOLING: 16460.4

Raw Source Energy per Square
Foot of Total Building Area = 78080.0 BTU

BCEP INPUT FORM

EMC ENGINEERS, INC. DENVER, COLORADO

CASE TYPE NEW (1) EXISTING (2)	EXISTING INPUT FILE (XXXXXX.IN)		BIN CHART FOR THIS RUN (XBINXX.XX)
(2)	1850B.I16		

PROJECT DESCRIPTION (20 CHAR)	CASE DESCRIPTION (20 CHAR)	CASE or ECM #	DATE (mm/dd/yy)
	ECONOMIZER CYCLE	1	4/13/93

PREPARED BY: (6C)	BUILDING NAME: (6C)	TOTAL FLOOR AREA (R)	# OF ZONES (1)	ZONE NUMBER (1)	FAN SYSTEM Y N

HEATING	MONTH ON (00-12) (1)	MONTH OFF (01-12) (1)	DD CORR. FACTOR (R)	FUEL TYPE (1)	EQPT. CAPACITY (R)	# PART LOAD PTS 2 MIN 11 MAX

PART LOAD POINTS (R)	1	2	3	4	5	6	7	8	9	10	11	EFFICIENCY POINTS (R)	1	2	3	4	5	6	7	8	9	10	11

COOLING	MONTH ON (00-12) (1)	MONTH OFF (01-12) (1)		FUEL TYPE (1)	EQPT. CAPACITY (R)	# PART LOAD PTS. 2 MIN 11 MAX

PART LOAD POINTS	1	2	3	4	5	6	7	8	9	10	11	EFFICIENCY POINTS	1	2	3	4	5	6	7	8	9	10	11

BIN Nº HEATING BEGINS (1)	BIN Nº COOLING BEGINS (1)	HEAT NON-WORK HOURS ? Y N	COOL NON-WORK HOURS ? Y N

CONDUCTION	RUN THIS ZONE ? Y N		SOLAR RAD DISK FILE:

	WALLS NORTH	EAST	SOUTH	WEST	ROOF
AREA (R)					
U-VALUE (R)					
COLOR ADJUSTMENT FACTOR (R)					
CLTD (1)					
EXTERNAL SHADE FACTOR (R)					

ATTIC VENTILATION ? Y N	PERCENT POSSIBLE SUMMER SUNSHINE (R)	PERCENT POSSIBLE WINTER SUNSHINE (R)

	GLASS (VERTICAL) N	NE	E	SE	S	SW	W	NW	SKYLIGHT or ROOF GLASS
AREA (R)									
U-FACTOR (R)									
SHADING COEFFICIENT (R)									
COOLING LOAD FACTOR (R)									
MAX SHGF, SUMMER (1)									
MAX SHGF, WINTER (1)									
EXTERNAL SHADE FACTOR (R)									

FLOOR TYPE 0: NONE 1: PERIM. 2: CRAWL	(2) FLOOR AREA (R)	(2) FLOOR U-VALUE (R)	CRAWL SPACE TEMPERATURE S W (R)	EXPOSED PERIMETER LENGTH (R)

TEMP RANGE (1)		DESIGN DAY TEMPERATURE (R) S W	SPACE HEATING TEMPERATURE (R) D N	SPACE COOLING TEMPERATURE (R) D N

CONVECTION Y N	ELEVATION	AIR FLOW RATES-OCCUP/UNOCUP ACFM(R) ACFM(R)	HEATING AIR TEMP (R) D N	COOLING AIR TEMP (R) D N

INTERNAL GAINS	RUN THIS ZONE ? Y N	Nº of TYPES ? (1)	INTERNAL GAINS TYPES DHW (1)	LIGHTS (2)	APPLIANCES (3)	MISC. (4)	PEOPLE (5)
DAY:	FUEL TYPE	(1)					X
	BTUH / UNIT	(R)					
	NUMBER OF UNITS	(1)					
	SPACE LOAD FACTOR	(R)					
	SCHEDULE CORRECTION FACTOR	(R)					
NIGHT:	BTUH / UNIT	(R)					
	NUMBER OF UNITS	(1)					
	SPACE LOAD FACTOR	(R)					
	SCHEDULE CORRECTION FACTOR	(R)					
	EFFICIENCY	(R)					X

INPUT FILE (XXXXXX.IN) 1850B.I16 OUTPUT FILE (XXXXXX.RPT) 1850B.R16

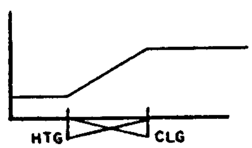
VBCEP INPUT FORM

EMC ENGINEERS, INC. DENVER, COLORADO

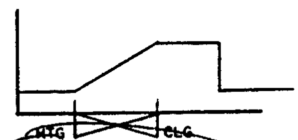
BUILDING NUMBER
P-1850B

SUPPLY AIR (ACFM)	OCCUPIED HOURS: (R)	UNOCCUPIED HOURS: (R)
MAX OA/SA RATIO	OCCUPIED HOURS: 0.95 (R)	UNOCCUPIED HOURS: 0.95 (R)
MIN OA/SA RATIO	OCCUPIED HOURS: 0.10 (R)	UNOCCUPIED HOURS: 0.10 (R)
APPROXIMATE RETURN AIR TEMP, °F	HEATING OCCUPIED HOURS (R)	HEATING UNOCCUPIED HOURS (R)
	COOLING OCCUPIED HOURS (R)	COOLING UNOCCUPIED HOURS (R)
	DESIRED MIXED AIR TEMPERATURE, °F (R) 0.0 IF FIXED OA OR ZONE CONTROLLED	

ECONOMIZER TYPES



TYPE 1 – "DUMB"



TYPE 2 – "SMART"

ELEVATION IN FEET (R) 5840

DEBUG REPORT	1= MONTHLY MIXED AIR REPORT BY BIN INCREMENT 2= ANNUAL REPORT BY MONTH

PROJECT--FT CARSON UPDATE EEAP

BUILDING--1850B
CASE--ECONOMIZER CYCLE
DATE--4/13/93
PREPARED BY--AJN

ZONE # 1
CASE #1

******************** BIN HEATING AND COOLING LOADS REPORT BUILDING BOUNDARY ********************

BIN F	HOURS 7-17	HOURS 18- 6	MECH HEATING LOADS 7 - 17 MBTU	MECH HEATING LOADS 18 - 6 MBTU	MECH COOLING LOADS 7 - 17 MBTU	MECH COOLING LOADS 18 - 6 MBTU
-25 to -20	0	0	.0000	.0000	.0000	.0000
-20 to -15	0	0	.0000	.0000	.0000	.0000
-15 to -10	0	0	.0000	.0000	.0000	.0000
-10 to -5	0	2	.0000	.1524	.0000	.0000
-5 to 0	0	8	.0000	.5580	.0000	.0000
0 to 5	19	90	1.0331	5.6818	.0000	.0000
5 to 10	28	110	1.3373	6.2868	.0000	.0000
10 to 15	52	153	2.1514	7.8277	.0000	.0000
15 to 20	85	273	2.9664	12.2230	.0000	.0000
20 to 25	160	313	4.5488	12.0270	.0000	.0000
25 to 30	183	415	3.9844	13.1700	.0000	.0000
30 to 35	155	292	2.3598	7.3785	.0000	.0000
35 to 40	213	338	1.7991	6.3537	.0000	.0000
40 to 45	213	415	.3308	4.7283	.0000	.0000
45 to 50	266	509	.0000	2.5183	.0000	.0000
50 to 55	274	457	.0000	.0459	.0000	.0000
55 to 60	271	470	.0000	.0000	.0000	.0000
60 to 65	302	511	.0000	.0000	.0000	.0000
65 to 70	359	372	.0000	.0000	.0000	.0000
70 to 75	318	202	.0000	.0000	7.8788	.0000
75 to 80	311	101	.0000	.0000	10.4600	.0000
80 to 85	227	50	.0000	.0000	10.0260	.0000
85 to 90	182	27	.0000	.0000	9.3773	.0000
90 to 95	32	2	.0000	.0000	1.8392	.0000
95 to 100	0	0	.0000	.0000	.0000	.0000
100 to 105	0	0	.0000	.0000	.0000	.0000
ANN	3650	5110	20.5109	78.9515	39.5813	.0000

PROJECT--FT CARSON UPDATE EEAP

BUILDING--1850B
CASE--ECONOMIZER CYCLE
DATE--4/13/93
PREPARED BY--AJN

ZONE # 1
CASE #1

******************** MONTHLY HEATING AND COOLING ********************
******************** LOADS REPORT ********************
******************** BUILDING BOUNDARY ********************

MONTH	MECH HEATING LOADS 7 - 17 MBTU	MECH HEATING LOADS 18 - 6 MBTU	MECH COOLING LOADS 7 - 17 MBTU	MECH COOLING LOADS 18 - 6 MBTU
01 JAN	5.1888	16.7490	.0000	.0000
02 FEB	4.8721	14.8820	.0000	.0000
03 MAR	3.0119	11.0930	.0000	.0000
04 APR	.4475	5.1263	.0000	.0000
05 MAY	.0120	1.5139	2.9435	.0000
06 JUN	.0000	.0000	5.5254	.0000
07 JUL	.0000	.0000	13.1410	.0000
08 AUG	.0000	.0000	10.6770	.0000
09 SEP	.0082	.7263	7.2949	.0000
10 OCT	.3084	4.0165	.0000	.0000
11 NOV	3.4525	12.0830	.0000	.0000
12 DEC	3.2095	12.7610	.0000	.0000
ANN	20.5109	78.9515	39.5813	.0000

Building Boundary Energy per Square
Foot of Total Building area = 26652.0 BTU

PROJECT--FT CARSON UPDATE EEAP

BUILDING--1850B
CASE--ECONOMIZER CYCLE
DATE--4/13/93
PREPARED BY--AJN

ZONE # 1
CASE #1

******************* BIN SOLAR ENERGY REPORT *******************
******************* DIRECT GAIN THROUGH *******************
******************* WINDOWS AND SKYLIGHTS *******************

BIN F	HOURS 7-17	SOLAR DIRECT GAIN 7 - 17 MBTU
-25 to -20	0	.0000
-20 to -15	0	.0000
-15 to -10	0	.0000
-10 to -5	0	.0000
-5 to 0	0	.0000
0 to 5	19	.0589
5 to 10	28	.0948
10 to 15	52	.1908
15 to 20	85	.3361
20 to 25	160	.6781
25 to 30	183	.8276
30 to 35	155	.7451
35 to 40	213	1.0845
40 to 45	213	1.1451
45 to 50	266	1.5056
50 to 55	274	1.6288
55 to 60	271	1.6881
60 to 65	302	1.9670
65 to 70	359	2.4404
70 to 75	318	2.2521
75 to 80	311	2.2910
80 to 85	227	1.7368
85 to 90	182	1.4442
90 to 95	32	.2630
95 to 100	0	.0000
100 to 105	0	.0000
ANN	3650	22.3781

PROJECT--FT CARSON UPDATE EEAP

BUILDING--1850B
CASE--ECONOMIZER CYCLE
DATE--4/13/93
PREPARED BY--AJN

ZONE # 1
CASE #1

****************** MONTHLY INTERNAL GAINS REPORT: ******************
****************** LOADS AND RAW SOURCE ENERGY ******************
****************** CONSUMPTION ******************

MONTH	DHW ELEC MBTU	LIGHTS ELEC MBTU	APPLIANC ELEC MBTU	MISC ELEC MBTU	PEOPLE MBTU
01 J	.3956	3.6848	.5363	3.5546	.8695
02 F	.3573	3.3282	.4844	3.2106	.7854
03 M	.3956	3.6848	.5363	3.5546	.8695
04 A	.3828	3.5659	.5190	3.4400	.8415
05 M	.3956	3.6848	.5363	3.5546	.8695
06 J	.3828	3.5659	.5190	3.4400	.8415
07 J	.3956	3.6848	.5363	3.5546	.8695
08 A	.3956	3.6848	.5363	3.5546	.8695
09 S	.3828	3.5659	.5190	3.4400	.8415
10 O	.3956	3.6848	.5363	3.5546	.8695
11 N	.3828	3.5659	.5190	3.4400	.8415
12 D	.3956	3.6848	.5363	3.5546	.8695
TOT	4.6578	43.3850	6.3143	41.8531	10.2382
RAW SOURCE	15.8307	147.4556	21.4610	142.2489	10.2382

PROJECT--FT CARSON UPDATE EEAP

BUILDING--1850B
CASE--ECONOMIZER CYCLE
DATE--4/13/93
PREPARED BY--AJN

ALL ZONES
CASE #1

******************* MONTHLY HEATING AND COOLING *******************
******************* OUTSIDE AIR LOADS *******************
******************* BUILDING BOUNDARY *******************

MONTH	HEATING MBTU	COOLING MBTU
01 JAN	13.50532	.00000
02 FEB	12.30418	.00000
03 MAR	9.88685	.00000
04 APR	5.16984	.00000
05 MAY	2.52130	.07114
06 JUN	.00000	.37484
07 JUL	.00000	1.53494
08 AUG	.00000	.84545
09 SEP	1.39540	.61288
10 OCT	3.88935	.00000
11 NOV	10.05649	.00000
12 DEC	10.19466	.00000
	----------	----------
ANN	68.92340	3.43926

PROJECT--FT CARSON UPDATE EEAP

BUILDING--1850B
CASE--ECONOMIZER CYCLE
DATE--4/13/93
PREPARED BY--AJN

ALL ZONES
CASE #1

******************** MONTHLY HEATING AND COOLING ********************
******************** RAW SOURCE ENERGY ********************
******************** CONSUMPTION REPORT ********************

MONTH	TOTAL HEATING NAT GAS MBTU	TOTAL COOLING NAT GAS MBTU
01 J	56.1701	.0000
02 F	50.8053	.0000
03 M	38.0226	.0000
04 A	17.0263	.0000
05 M	6.4140	5.7862
06 J	.0000	11.3248
07 J	.0000	28.1682
08 A	.0000	22.1156
09 S	3.3756	15.1781
10 O	13.0178	.0000
11 N	40.5578	.0000
12 D	41.4660	.0000
ANN	266.8554	82.5730

BTU/SF/YR HEATING: 51151.1 COOLING: 15827.7

Raw Source Energy per Square
Foot of Total Building Area = 66978.8 BTU

BCEP INPUT FORM

EMC ENGINEERS, INC. DENVER, COLORADO

CASE TYPE NEW (1) EXISTING (2)	EXISTING INPUT FILE (XXXXXX.IN)	BIN CHART FOR THIS RUN (XBINXX.XX)
2	2359A.IN	FCBIN.4

PROJECT DESCRIPTION (20 CHAR)	CASE DESCRIPTION (20 CHAR)	CASE or ECM #	DATE (mm/dd/yy)
FT CARSON UPDATE EEAP	BASELINE	Ø	4/13/93

PREPARED BY: (6C)	BUILDING NAME: (6C)	TOTAL FLOOR AREA (R)	# OF ZONES (I)	ZONE NUMBER (I)	FAN SYSTEM Y N
AJN	P-2359A	3460.0	1	1	Y

HEATING	MONTH ON (00-12) (I)	MONTH OFF (01-12) (I)	DD CORR. FACTOR (R)	FUEL TYPE (I)	EQPT. CAPACITY (R)	# PART LOAD PTS 2 MIN 11 MAX
	9	5	1.0	3	1,000,000	2

	1	2	3	4	5	6	7	8	9	10	11
PART LOAD POINTS (R)	0.1	1.0									
EFFICIENCY POINTS (R)	.63	.63									

COOLING	MONTH ON (00-12) (I)	MONTH OFF (01-12) (I)	FUEL TYPE (I)	EQPT. CAPACITY (R)	# PART LOAD PTS. 2 MIN 11 MAX
	5	9	3	1,000,000	2

	1	2	3	4	5	6	7	8	9	10	11
PART LOAD POINTS	0.1	1.0									
EFFICIENCY POINTS	.52	.52									

BIN Nº HEATING BEGINS (I)	BIN Nº COOLING BEGINS (I)	HEAT NON-WORK HOURS ? Y N	COOL NON-WORK HOURS ? Y N
17	20	Y	N

CONDUCTION	RUN THIS ZONE ? Y N	SOLAR RAD DISK FILE:
	Y	SOLAR.NE

WALLS	NORTH	EAST	SOUTH	WEST	ROOF
AREA (R)	773.0	587.2	728.5	1298.8	4035.4
U-VALUE (R)	0.129	0.129	0.129	0.129	0.109
COLOR ADJUSTMENT FACTOR (R)	0.83	0.83	0.83	0.83	0.5
CLTD (I)	410	495	491	406	705
EXTERNAL SHADE FACTOR (R)	1.0	0.5	0.75	1.0	1.0

ATTIC VENTILATION ? Y N	PERCENT POSSIBLE SUMMER SUNSHINE (R)	PERCENT POSSIBLE WINTER SUNSHINE (R)
Y	67.0	66.0

GLASS (VERTICAL)	N	NE	E	SE	S	SW	W	NW	SKYLIGHT or ROOF GLASS
AREA (R)		261.4		192.0		253.3		132.0	
U-FACTOR (R)		0.68		0.568		0.847		0.568	
SHADING COEFFICIENT (R)		0.9		0.88		0.94		0.88	
COOLING LOAD FACTOR (R)		5.2		6.2		6.2		5.2	
MAX SHGF, SUMMER (I)		163		170		170		163	
MAX SHGF, WINTER (I)		20		241		241		20	
EXTERNAL SHADE FACTOR (R)		0.0		0.3		0.5		0.9	

FLOOR TYPE 0: NONE 1: PERIM 2: CRAWL	(2) FLOOR AREA (R)	(2) FLOOR U-VALUE (R)	CRAWL SPACE TEMPERATURE (R)	EXPOSED PERIMETER LENGTH (R)
1	—	0.36	S — W —	203.0

TEMP RANGE (I)	DESIGN DAY TEMPERATURE (R)	SPACE HEATING TEMPERATURE (R)	SPACE COOLING TEMPERATURE (R)
30	S 91.0 W -3.0	D 70.0 N 70.0	D 75.0 N 0.0

CONVECTION Y N	ELEVATION	AIR FLOW RATES-OCCUP/UNOCUP	HEATING AIR TEMP (R)	COOLING AIR TEMP (R)
N	5840	0.0 ACFM(R) 0.0 ACFM(R)	D 0.0 N 0.0	D 0.0 N 0.0

INTERNAL GAINS	RUN THIS ZONE ? Y N	Nº of TYPES ? (I)
	Y	

INTERNAL GAINS TYPES		DHW (1)	LIGHTS (2)	APPLIANCES (3)	MISC. (4)	PEOPLE (5)
	FUEL TYPE (I)	1	1		1	
DAY:	BTUH / UNIT (R)	549.2	26,963.0		8914.5	255.0
	NUMBER OF UNITS (I)	1	1		1	8
	SPACE LOAD FACTOR (R)	0.01	0.5		0.0	1.0
	SCHEDULE CORRECTION FACTOR (R)	1.0	0.5		0.353	0.75
NIGHT:	BTUH / UNIT (R)	549.2	26,963.0		8914.5	255.0
	NUMBER OF UNITS (I)	1	1		1	1
	SPACE LOAD FACTOR (R)	0.01	0.5		0.0	1.0
	SCHEDULE CORRECTION FACTOR (R)	0.0	0.10		0.391	0.25
	EFFICIENCY (R)	100.0	100.0		100.0	

INPUT FILE (XXXXXX.IN)	OUTPUT FILE (XXXXXX.RPT)
2359A.IN	2359A.RPT

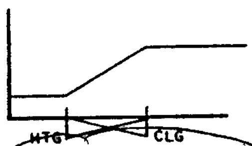
VBCEP INPUT FORM

EMC ENGINEERS, INC. DENVER, COLORADO

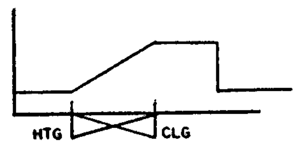
BUILDING NUMBER
P-2359A

SUPPLY AIR (ACFM)	OCCUPIED HOURS: 3445.0 (R)	UNOCCUPIED HOURS: 3445.0 (R)
MAX OA/SA RATIO	OCCUPIED HOURS: 0.15 (R)	UNOCCUPIED HOURS: 0.15 (R)
MIN OA/SA RATIO	OCCUPIED HOURS: 0.15 (R)	UNOCCUPIED HOURS: 0.15 (R)
APPROXIMATE RETURN AIR TEMP, °F	HEATING OCCUPIED HOURS 70.0 (R)	HEATING UNOCCUPIED HOURS 70.0 (R)
	COOLING OCCUPIED HOURS 75.0 (R)	COOLING UNOCCUPIED HOURS 75.0 (R)
	DESIRED MIXED AIR TEMPERATURE, °F 0.0 IF FIXED OA OR ZONE CONTROLLED 0.0 (R)	

ECONOMIZER TYPES



TYPE 1 – "DUMB"



TYPE 2 – "SMART"

ELEVATION IN FEET (R) 5840

DEBUG REPORT	1 = MONTHLY MIXED AIR REPORT BY BIN INCREMENT 2 = ANNUAL REPORT BY MONTH

PROJECT--FT CARSON UPDATE EEAP

BUILDING--2359A
CASE--BASELINE
DATE--4/13/93
PREPARED BY--AJN

ZONE # 1
CASE #0

******************* BIN HEATING AND COOLING LOADS REPORT BUILDING BOUNDARY *******************

BIN F	HOURS 7-17	18- 6	MECH HEATING LOADS 7 - 17 MBTU	18 - 6 MBTU	MECH COOLING LOADS 7 - 17 MBTU	18 - 6 MBTU
-25 to -20	0	0	.0000	.0000	.0000	.0000
-20 to -15	0	0	.0000	.0000	.0000	.0000
-15 to -10	0	0	.0000	.0000	.0000	.0000
-10 to -5	0	2	.0000	.2235	.0000	.0000
-5 to 0	0	8	.0000	.8320	.0000	.0000
0 to 5	19	90	1.3950	8.6452	.0000	.0000
5 to 10	28	110	1.8415	9.7580	.0000	.0000
10 to 15	52	153	3.0293	12.4510	.0000	.0000
15 to 20	85	273	4.3113	20.1080	.0000	.0000
20 to 25	160	313	6.9072	20.6380	.0000	.0000
25 to 30	183	415	6.4741	24.0210	.0000	.0000
30 to 35	155	292	4.3046	14.6260	.0000	.0000
35 to 40	213	338	4.2254	14.2480	.0000	.0000
40 to 45	213	415	2.4785	13.3650	.0000	.0000
45 to 50	266	509	1.0356	11.7380	.0000	.0000
50 to 55	274	457	.0000	6.3601	.0000	.0000
55 to 60	271	470	.0000	2.7015	.0000	.0000
60 to 65	302	511	.0000	.0000	.0000	.0000
65 to 70	359	372	.0000	.0000	.0000	.0000
70 to 75	318	202	.0000	.0000	7.2270	.0000
75 to 80	311	101	.0000	.0000	10.0320	.0000
80 to 85	227	50	.0000	.0000	9.9251	.0000
85 to 90	182	27	.0000	.0000	9.5056	.0000
90 to 95	32	2	.0000	.0000	1.8990	.0000
95 to 100	0	0	.0000	.0000	.0000	.0000
100 to 105	0	0	.0000	.0000	.0000	.0000
ANN	3650	5110	36.0024	159.7155	38.5885	.0000

PROJECT--FT CARSON UPDATE EEAP

BUILDING--2359A
CASE--BASELINE
DATE--4/13/93
PREPARED BY--AJN

ZONE # 1
CASE #0

******************** MONTHLY HEATING AND COOLING ********************
******************** LOADS REPORT ********************
******************** BUILDING BOUNDARY ********************

MONTH	MECH HEATING LOADS 7 - 17 MBTU	MECH HEATING LOADS 18 - 6 MBTU	MECH COOLING LOADS 7 - 17 MBTU	MECH COOLING LOADS 18 - 6 MBTU
01 JAN	8.7946	28.6970	.0000	.0000
02 FEB	7.9273	25.7670	.0000	.0000
03 MAR	5.1968	21.7790	.0000	.0000
04 APR	1.3148	12.8960	.0000	.0000
05 MAY	.1018	7.5453	2.7697	.0000
06 JUN	.0000	.0000	5.3316	.0000
07 JUL	.0000	.0000	13.0020	.0000
08 AUG	.0000	.0000	10.3850	.0000
09 SEP	.1582	4.8736	7.1003	.0000
10 OCT	.7843	12.0800	.0000	.0000
11 NOV	5.9953	22.7010	.0000	.0000
12 DEC	5.7292	23.3770	.0000	.0000
ANN	36.0024	159.7155	38.5885	.0000

Building Boundary Energy per Square
Foot of Total Building area = 67718.6 BTU

PROJECT--FT CARSON UPDATE EEAP

BUILDING--2359A
CASE--BASELINE
DATE--4/13/93
PREPARED BY--AJN

ZONE # 1
CASE #0

******************* BIN SOLAR ENERGY REPORT *******************
******************* DIRECT GAIN THROUGH *******************
******************* WINDOWS AND SKYLIGHTS *******************

BIN F	HOURS 7-17	SOLAR DIRECT GAIN 7 - 17 MBTU
-25 to -20	0	.0000
-20 to -15	0	.0000
-15 to -10	0	.0000
-10 to -5	0	.0000
-5 to 0	0	.0000
0 to 5	19	.3003
5 to 10	28	.4435
10 to 15	52	.8254
15 to 20	85	1.3520
20 to 25	160	2.5503
25 to 30	183	2.9230
30 to 35	155	2.4809
35 to 40	213	3.4163
40 to 45	213	3.4233
45 to 50	266	4.2840
50 to 55	274	4.4219
55 to 60	271	4.3825
60 to 65	302	4.8938
65 to 70	359	5.8294
70 to 75	318	5.1742
75 to 80	311	5.0706
80 to 85	227	3.7086
85 to 90	182	2.9794
90 to 95	32	.5249
95 to 100	0	.0000
100 to 105	0	.0000
ANN	3650	58.9843

PROJECT--FT CARSON UPDATE EEAP

BUILDING--2359A
CASE--BASELINE
DATE--4/13/93
PREPARED BY--AJN

ZONE # 1
CASE #0

****************** MONTHLY INTERNAL GAINS REPORT: ******************
****************** LOADS AND RAW SOURCE ENERGY ******************
****************** CONSUMPTION ******************

MONTH	DHW ELEC MBTU	LIGHTS ELEC MBTU	MISC ELEC MBTU	PEOPLE MBTU
01 J	.1703	5.3495	2.4883	.5020
02 F	.1538	4.8318	2.2475	.4534
03 M	.1703	5.3495	2.4883	.5020
04 A	.1648	5.1769	2.4080	.4858
05 M	.1703	5.3495	2.4883	.5020
06 J	.1648	5.1769	2.4080	.4858
07 J	.1703	5.3495	2.4883	.5020
08 A	.1703	5.3495	2.4883	.5020
09 S	.1648	5.1769	2.4080	.4858
10 O	.1703	5.3495	2.4883	.5020
11 N	.1648	5.1769	2.4080	.4858
12 D	.1703	5.3495	2.4883	.5020
TOT	2.0046	62.9856	29.2971	5.9103
RAW SOURCE	6.8131	214.0734	99.5743	5.9103

PROJECT--FT CARSON UPDATE EEAP

BUILDING--2359A
CASE--BASELINE
DATE--4/13/93
PREPARED BY--AJN

ALL ZONES
CASE #0

******************** MONTHLY HEATING AND COOLING ********************
******************** OUTSIDE AIR LOADS ********************
******************** BUILDING BOUNDARY ********************

MONTH	HEATING MBTU	COOLING MBTU
01 JAN	15.19343	.00000
02 FEB	13.81052	.00000
03 MAR	11.97079	.00000
04 APR	7.31439	.00000
05 MAY	4.49704	.05877
06 JUN	.00000	.30967
07 JUL	.00000	1.26808
08 AUG	.00000	.69846
09 SEP	2.79113	.50633
10 OCT	5.87678	.00000
11 NOV	12.01328	.00000
12 DEC	12.16541	.00000
ANN	85.63278	2.84131

PROJECT--FT CARSON UPDATE EEAP

BUILDING--2359A
CASE--BASELINE
DATE--4/13/93
PREPARED BY--AJN

ALL ZONES
CASE #0

******************** MONTHLY HEATING AND COOLING ********************
******************** RAW SOURCE ENERGY ********************
******************** CONSUMPTION REPORT ********************

MONTH	TOTAL HEATING NAT GAS MBTU	TOTAL COOLING NAT GAS MBTU
01 J	83.4950	.0000
02 F	75.2845	.0000
03 M	61.7228	.0000
04 A	34.1129	.0000
05 M	19.2459	5.4288
06 J	.0000	10.8278
07 J	.0000	27.3905
08 A	.0000	21.2726
09 S	12.3978	14.6001
10 O	29.6998	.0000
11 N	64.5159	.0000
12 D	65.4060	.0000
ANN	445.8806	79.5198

BTU/SF/YR HEATING: 128867.2 COOLING: 22982.6

Raw Source Energy per Square
Foot of Total Building Area = 151849.8 BTU

BCEP INPUT FORM

EMC ENGINEERS, INC. DENVER, COLORADO

CASE TYPE NEW (1) EXISTING (2)	EXISTING INPUT FILE (XXXXXX.IN)		BIN CHART FOR THIS RUN (XBINXX.XX)
(2)	2359A.I16		

PROJECT DESCRIPTION (20 CHAR)	CASE DESCRIPTION (20 CHAR)	CASE or ECM #	DATE (mm/dd/yy)
	ECONOMIZER CYCLE	1	6/28/93

PREPARED BY: (6C)	BUILDING NAME: (6C)	TOTAL FLOOR AREA (R)	# OF ZONES (1)	ZONE NUMBER (1)	FAN SYSTEM Y N

HEATING	MONTH ON (00-12) (1)	MONTH OFF (01-12) (1)	DD CORR. FACTOR (R)	FUEL TYPE (1)	EQPT. CAPACITY (R)	# PART LOAD PTS 2 MIN 11 MAX

PART LOAD POINTS (R)	1	2	3	4	5	6	7	8	9	10	11
EFFICIENCY POINTS (R)	1	2	3	4	5	6	7	8	9	10	11

COOLING	MONTH ON (00-12) (1)	MONTH OFF (01-12) (1)		FUEL TYPE (1)	EQPT. CAPACITY (R)	# PART LOAD PTS. 2 MIN 11 MAX

PART LOAD POINTS	1	2	3	4	5	6	7	8	9	10	11
EFFICIENCY POINTS	1	2	3	4	5	6	7	8	9	10	11

BIN Nº HEATING BEGINS (1)	BIN Nº COOLING BEGINS (1)	HEAT NON-WORK HOURS ? Y N	COOL NON-WORK HOURS? Y N

CONDUCTION	RUN THIS ZONE ? Y N		SOLAR RAD DISK FILE:

	WALLS NORTH	EAST	SOUTH	WEST	ROOF
AREA (R)					
U-VALUE (R)					
COLOR ADJUSTMENT FACTOR (R)					
CLTD (1)					
EXTERNAL SHADE FACTOR (R)					

ATTIC VENTILATION ? Y N	PERCENT POSSIBLE SUMMER SUNSHINE (R)	PERCENT POSSIBLE WINTER SUNSHINE (R)

	GLASS (VERTICAL) N	NE	E	SE	S	SW	W	NW	SKYLIGHT or ROOF GLASS
AREA (R)									
U-FACTOR (R)									
SHADING COEFFICIENT (R)									
COOLING LOAD FACTOR (R)									
MAX SHGF, SUMMER (1)									
MAX SHGF, WINTER (1)									
EXTERNAL SHADE FACTOR (R)									

FLOOR TYPE 0: NONE 1: PERIM. 2: CRAWL	(2) FLOOR AREA (R)	(2) FLOOR U-VALUE (R)	CRAWL SPACE TEMPERATURE S W (R)	EXPOSED PERIMETER LENGTH (R)

TEMP RANGE (1)		DESIGN DAY TEMPERATURE (R) S W	SPACE HEATING TEMPERATURE (R) D N	SPACE COOLING TEMPERATURE (R) D N

CONVECTION Y N	ELEVATION	AIR FLOW RATES—OCCUP / UNOCUP ACFM(R) ACFM(R)	HEATING AIR TEMP (R) D N	COOLING AIR TEMP (R) D N

INTERNAL GAINS	RUN THIS ZONE ? Y N	Nº of TYPES ? (1)	INTERNAL GAINS TYPES DHW (1)	LIGHTS (2)	APPLIANCES (3)	MISC. (4)	PEOPLE (5)
DAY:	FUEL TYPE	(1)					X
	BTUH / UNIT	(R)					
	NUMBER OF UNITS	(1)					
	SPACE LOAD FACTOR	(R)					
	SCHEDULE CORRECTION FACTOR	(R)					
NIGHT:	BTUH / UNIT	(R)					
	NUMBER OF UNITS	(1)					
	SPACE LOAD FACTOR	(R)					
	SCHEDULE CORRECTION FACTOR	(R)					
	EFFICIENCY	(R)					X

INPUT FILE (XXXXXX.IN) 2359A.I16 OUTPUT FILE (XXXXXX.RPT) 2359A.R16

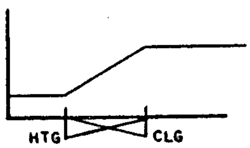
VBCEP INPUT FORM

EMC ENGINEERS, INC. DENVER, COLORADO

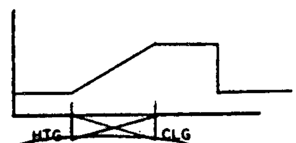
BUILDING NUMBER
P-2359A

SUPPLY AIR (ACFM)	OCCUPIED HOURS: (R)	UNOCCUPIED HOURS: (R)
MAX OA/SA RATIO	OCCUPIED HOURS: 0.94 (R)	UNOCCUPIED HOURS: 0.06 (R)
MIN OA/SA RATIO	OCCUPIED HOURS: 0.06 (R)	UNOCCUPIED HOURS: 0.06 (R)
APPROXIMATE RETURN AIR TEMP, °F	HEATING OCCUPIED HOURS (R)	HEATING UNOCCUPIED HOURS (R)
	COOLING OCCUPIED HOURS (R)	COOLING UNOCCUPIED HOURS (R)
	DESIRED MIXED AIR TEMPERATURE, °F 0.0 IF FIXED OA OR ZONE CONTROLLED (R)	

ECONOMIZER TYPES



TYPE 1 - "DUMB"



TYPE 2 - "SMART"

ELEVATION IN FEET (R)

DEBUG REPORT	1 = MONTHLY MIXED AIR REPORT BY BIN INCREMENT 2 = ANNUAL REPORT BY MONTH

PROJECT--FT CARSON UPDATE EEAP

BUILDING--2359A
CASE--ECONOMIZER CYCLE
DATE--6/23/93
PREPARED BY--AJN

ZONE # 1
CASE #1

******************* BIN HEATING AND COOLING *******************
******************* LOADS REPORT *******************
******************* BUILDING BOUNDARY *******************

BIN F	HOURS 7-17	HOURS 18- 6	MECH HEATING LOADS 7 - 17 MBTU	MECH HEATING LOADS 18 - 6 MBTU	MECH COOLING LOADS 7 - 17 MBTU	MECH COOLING LOADS 18 - 6 MBTU
-25 to -20	0	0	.0000	.0000	.0000	.0000
-20 to -15	0	0	.0000	.0000	.0000	.0000
-15 to -10	0	0	.0000	.0000	.0000	.0000
-10 to -5	0	2	.0000	.2235	.0000	.0000
-5 to 0	0	8	.0000	.8320	.0000	.0000
0 to 5	19	90	1.3950	8.6452	.0000	.0000
5 to 10	28	110	1.8415	9.7580	.0000	.0000
10 to 15	52	153	3.0293	12.4510	.0000	.0000
15 to 20	85	273	4.3113	20.1080	.0000	.0000
20 to 25	160	313	6.9072	20.6380	.0000	.0000
25 to 30	183	415	6.4741	24.0210	.0000	.0000
30 to 35	155	292	4.3046	14.6260	.0000	.0000
35 to 40	213	338	4.2254	14.2480	.0000	.0000
40 to 45	213	415	2.4785	13.3650	.0000	.0000
45 to 50	266	509	1.0356	11.7380	.0000	.0000
50 to 55	274	457	.0000	6.3601	.0000	.0000
55 to 60	271	470	.0000	2.7015	.0000	.0000
60 to 65	302	511	.0000	.0000	.0000	.0000
65 to 70	359	372	.0000	.0000	.0000	.0000
70 to 75	318	202	.0000	.0000	7.2270	.0000
75 to 80	311	101	.0000	.0000	10.0320	.0000
80 to 85	227	50	.0000	.0000	9.9251	.0000
85 to 90	182	27	.0000	.0000	9.5056	.0000
90 to 95	32	2	.0000	.0000	1.8990	.0000
95 to 100	0	0	.0000	.0000	.0000	.0000
100 to 105	0	0	.0000	.0000	.0000	.0000
ANN	3650	5110	36.0024	159.7155	38.5885	.0000

PROJECT--FT CARSON UPDATE EEAP

BUILDING--2359A
CASE--ECONOMIZER CYCLE
DATE--6/23/93
PREPARED BY--AJN

ZONE # 1
CASE #1

******************** MONTHLY HEATING AND COOLING ********************
******************** LOADS REPORT ********************
******************** BUILDING BOUNDARY ********************

MONTH	MECH HEATING LOADS 7 - 17 MBTU	18 - 6 MBTU	MECH COOLING LOADS 7 - 17 MBTU	18 - 6 MBTU
01 JAN	8.7946	28.6970	.0000	.0000
02 FEB	7.9273	25.7670	.0000	.0000
03 MAR	5.1968	21.7790	.0000	.0000
04 APR	1.3148	12.8960	.0000	.0000
05 MAY	.1018	7.5453	2.7697	.0000
06 JUN	.0000	.0000	5.3316	.0000
07 JUL	.0000	.0000	13.0020	.0000
08 AUG	.0000	.0000	10.3850	.0000
09 SEP	.1582	4.8736	7.1003	.0000
10 OCT	.7843	12.0800	.0000	.0000
11 NOV	5.9953	22.7010	.0000	.0000
12 DEC	5.7292	23.3770	.0000	.0000
ANN	36.0024	159.7155	38.5885	.0000

Building Boundary Energy per Square
Foot of Total Building area = 67718.6 BTU

PROJECT--FT CARSON UPDATE EEAP

BUILDING--2359A
CASE--ECONOMIZER CYCLE
DATE--6/23/93
PREPARED BY--AJN

ZONE # 1
CASE #1

******************** BIN SOLAR ENERGY REPORT ********************
******************** DIRECT GAIN THROUGH ********************
******************** WINDOWS AND SKYLIGHTS ********************

BIN F	HOURS 7-17	SOLAR DIRECT GAIN 7 - 17 MBTU
-25 to -20	0	.0000
-20 to -15	0	.0000
-15 to -10	0	.0000
-10 to -5	0	.0000
-5 to 0	0	.0000
0 to 5	19	.3003
5 to 10	28	.4435
10 to 15	52	.8254
15 to 20	85	1.3520
20 to 25	160	2.5503
25 to 30	183	2.9230
30 to 35	155	2.4809
35 to 40	213	3.4163
40 to 45	213	3.4233
45 to 50	266	4.2840
50 to 55	274	4.4219
55 to 60	271	4.3825
60 to 65	302	4.8938
65 to 70	359	5.8294
70 to 75	318	5.1742
75 to 80	311	5.0706
80 to 85	227	3.7086
85 to 90	182	2.9794
90 to 95	32	.5249
95 to 100	0	.0000
100 to 105	0	.0000
ANN	3650	58.9843

PROJECT--FT CARSON UPDATE EEAP

BUILDING--2359A
CASE--ECONOMIZER CYCLE
DATE--6/23/93
PREPARED BY--AJN

ZONE # 1
CASE #1

******************* MONTHLY INTERNAL GAINS REPORT: *******************
******************* LOADS AND RAW SOURCE ENERGY *******************
******************* CONSUMPTION *******************

MONTH	DHW ELEC MBTU	LIGHTS ELEC MBTU	MISC ELEC MBTU	PEOPLE MBTU
01 J	.1703	5.3495	2.4883	.5020
02 F	.1538	4.8318	2.2475	.4534
03 M	.1703	5.3495	2.4883	.5020
04 A	.1648	5.1769	2.4080	.4858
05 M	.1703	5.3495	2.4883	.5020
06 J	.1648	5.1769	2.4080	.4858
07 J	.1703	5.3495	2.4883	.5020
08 A	.1703	5.3495	2.4883	.5020
09 S	.1648	5.1769	2.4080	.4858
10 O	.1703	5.3495	2.4883	.5020
11 N	.1648	5.1769	2.4080	.4858
12 D	.1703	5.3495	2.4883	.5020
TOT	2.0046	62.9856	29.2971	5.9103
RAW SOURCE	6.8131	214.0734	99.5743	5.9103

PROJECT--FT CARSON UPDATE EEAP

BUILDING--2359A
CASE--ECONOMIZER CYCLE
DATE--6/23/93
PREPARED BY--AJN

ALL ZONES
CASE #1

******************** MONTHLY HEATING AND COOLING ********************
******************** OUTSIDE AIR LOADS ********************
******************** BUILDING BOUNDARY ********************

MONTH	HEATING MBTU	COOLING MBTU
01 JAN	6.07737	.00000
02 FEB	5.52421	.00000
03 MAR	4.78832	.00000
04 APR	2.92576	.00000
05 MAY	1.79882	.02351
06 JUN	.00000	.12387
07 JUL	.00000	.50723
08 AUG	.00000	.27938
09 SEP	1.11645	.20253
10 OCT	2.35071	.00000
11 NOV	4.80531	.00000
12 DEC	4.86616	.00000
	----------	----------
ANN	34.25311	1.13652

PROJECT--FT CARSON UPDATE EEAP

BUILDING--2359A
CASE--ECONOMIZER CYCLE
DATE--6/23/93
PREPARED BY--AJN

ALL ZONES
CASE #1

******************** MONTHLY HEATING AND COOLING ********************
******************** RAW SOURCE ENERGY ********************
******************** CONSUMPTION REPORT ********************

MONTH	TOTAL HEATING NAT GAS MBTU	TOTAL COOLING NAT GAS MBTU
01 J	69.0480	.0000
02 F	62.1524	.0000
03 M	50.3401	.0000
04 A	27.1579	.0000
05 M	14.9698	5.3612
06 J	.0000	10.4711
07 J	.0000	25.9302
08 A	.0000	20.4682
09 S	9.7438	14.0169
10 O	24.1118	.0000
11 N	53.0928	.0000
12 D	53.8383	.0000
ANN	364.4548	76.2477

BTU/SF/YR HEATING: 105333.8 COOLING: 22036.9

TAB C-4

FORT CARSON RADIATOR CONTROLS
ECO #19

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION:	FORT CARSON, COLORADO	REGION:	4	PROJECT NO:	
PROJECT TITLE:	FT CARSON EEAP UPDATE			FISCAL YEAR:	1992
DISCRETE PORTION NAME:	ECO #19 - RADIATOR CONTROLS			BUILDING NO.:	S-6220
ANALYSIS DATE:	07/01/93	ECONOMIC LIFE:	15	PREPARED BY:	A. NIEMEYER

1 INVESTMENT COSTS

A. CONSTRUCTION COST	=		$6,750	
B. SIOH COST	(5.5% of 1A) =		$371	
C. DESIGN COST	(6.0% of 1A) =		$405	
D. TOTAL COST	(1A + 1B + 1C) =		$7,526	
E. SALVAGE VALUE	=		$0	
F. SALVAGE VALUE OF EXISTING EQUIP.	=		$0	
G. TOTAL INVESTMENT	(1D - 1E - 1F) =		---------->	$7,526

2 ENERGY SAVINGS (+) or COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS: OCTOBER 1992

ENERGY SOURCE	COST $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A. ELEC	$7.32		$0	11.70	$0	
B. DIST			$0	13.78	$0	
C. NAT GAS	$3.48	412.25	$1,433	14.16	$20,291	
D. COAL			$0	11.57	$0	
E. SOLAR			$0		$0	
F. DEMAND SAVINGS	$69.68 / year		$0	11.12	$0	
G. TOTAL		412.25	1,433.0		---------->	$20,291

3 NONENERGY SAVINGS (+) or COST (-)

A. ANNUAL RECURRING			$0	
1 DISCOUNT FACTOR	(From Table A-2) =	11.12		
2 DISCOUNTED SAVINGS or COST	(3A x 3A1) =		$0	

B. NONRECURRING

ITEM	SAVINGS or COST (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3)	DISCOUNTED SVGS or COST (4)	
a.	$0	0	0.00	$0	
b.	$0	0	0.00	$0	
c.	$0	0	0.00	$0	
d TOTAL	$0			$0	
C. TOTAL NONENERGY DISCOUNTED SAVINGS or COST			(3A2 + 3Bd4) =		$0

4 SIMPLE PAYBACK (SPB) - (YRS)	1G/(2G3 + 3A + (3Bd1/15)) =	5.3
5 TOTAL NET DISCOUNTED SAVINGS	(2G5 + 3C) =	$20,291
6 SAVINGS-TO-INVESTMENT RATIO (SIR)	(5/1G) =	2.70
7 ADJUSTED INTERNAL RATE OF RETURN (AIRR) - (%)	[(1+.04) x SIR to 1/15 power - 1] x 100 =	11.11

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION: FORT CARSON, COLORADO	REGION: 4	PROJECT NO:	
PROJECT TITLE: FT CARSON EEAP UPDATE		FISCAL YEAR:	1992
DISCRETE PORTION NAME: ECO #19 - RADIATOR CONTROLS		BUILDING NO.:	S-6221
ANALYSIS DATE: 07/01/93	ECONOMIC LIFE: 15	PREPARED BY:	A. NIEMEYER

1 INVESTMENT COSTS

A. CONSTRUCTION COST	=		$4,024	
B. SIOH COST	(5.5% of 1A) =		$221	
C. DESIGN COST	(6.0% of 1A) =		$241	
D. TOTAL COST	(1A + 1B + 1C) =		$4,487	
E. SALVAGE VALUE	=		$0	
F. SALVAGE VALUE OF EXISTING EQUIP.	=		$0	
G. TOTAL INVESTMENT	(1D - 1E - 1F) =		--------->	$4,487

2 ENERGY SAVINGS (+) or COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS: OCTOBER 1992

ENERGY SOURCE	COST $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A. ELEC	$7.32		$0	11.70	$0	
B. DIST			$0	13.78	$0	
C. NAT GAS	$3.48	193.37	$672	14.16	$9,518	
D. COAL			$0	11.57	$0	
E. SOLAR			$0		$0	
F. DEMAND SAVINGS	$69.68 / year		$0	11.12	$0	
G. TOTAL		193.37	$672		--------->	$9,518

3 NONENERGY SAVINGS (+) or COST (-)

A. ANNUAL RECURRING			$0
1 DISCOUNT FACTOR	(From Table A-2) =	11.12	
2 DISCOUNTED SAVINGS or COST	(3A x 3A1) =		$0

B. NONRECURRING

ITEM	SAVINGS or COST (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3)	DISCOUNTED SVGS or COST (4)
a.	$0	0	0.00	$0
b.	$0	0	0.00	$0
c.	$0	0	0.00	$0
d TOTAL	$0			$0

C. TOTAL NONENERGY DISCOUNTED SAVINGS or COST (3A2 + 3Bd4) = $0

4 SIMPLE PAYBACK (SPB) - (YRS)	1G/(2G3 + 3A + (3Bd1/15)) =	6.7
5 TOTAL NET DISCOUNTED SAVINGS	(2G5 + 3C) =	$9,518
6 SAVINGS-TO-INVESTMENT RATIO (SIR)	(5/1G) =	2.12
7 ADJUSTED INTERNAL RATE OF RETURN (AIRR) - (%)	[(1+.04) x SIR to 1/15 power - 1] x 100 =	9.35

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION: FORT CARSON, COLORADO REGION: 4 PROJECT NO:
PROJECT TITLE: FT CARSON EEAP UPDATE FISCAL YEAR: 1992
DISCRETE PORTION NAME: ECO #19 - RADIATOR CONTROLS BUILDING NO.: S-6222
ANALYSIS DATE: 07/01/93 ECONOMIC LIFE: 15 PREPARED BY: A. NIEMEYER

1 INVESTMENT COSTS

A.	CONSTRUCTION COST	=	$12,721	
B.	SIOH COST	(5.5% of 1A) =	$700	
C.	DESIGN COST	(6.0% of 1A) =	$763	
D.	TOTAL COST	(1A + 1B + 1C) =	$14,184	
E.	SALVAGE VALUE	=	$0	
F.	SALVAGE VALUE OF EXISTING EQUIP.	=	$0	
G.	TOTAL INVESTMENT	(1D - 1E - 1F) =	---------->	$14,184

2 ENERGY SAVINGS (+) or COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS: OCTOBER 1992

	ENERGY SOURCE	COST $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A.	ELEC	$7.32		$0	11.70	$0	
B.	DIST			$0	13.78	$0	
C.	NAT GAS	$3.48	641.17	$2,229	14.16	$31,558	
D.	COAL			$0	11.57	$0	
E.	SOLAR			$0		$0	
F.	DEMAND SAVINGS	$69.68 / year		$0	11.12	$0	
G.	TOTAL		641.17	$2,229		---------->	$31,558

3 NONENERGY SAVINGS (+) or COST (-)

A. ANNUAL RECURRING			$0	
1 DISCOUNT FACTOR	(From Table A-2) =	11.12		
2 DISCOUNTED SAVINGS or COST	(3A x 3A1) =		$0	

B. NONRECURRING

ITEM	SAVINGS or COST (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3)	DISCOUNTED SVGS or COST (4)
a.	$0	0	0.00	$0
b.	$0	0	0.00	$0
c.	$0	0	0.00	$0
d TOTAL	$0			$0

C. TOTAL NONENERGY DISCOUNTED SAVINGS or COST (3A2 + 3Bd4) = $0

4 SIMPLE PAYBACK (SPB) - (YRS)	1G/(2G3 + 3A + (3Bd1/15)) =	6.4
5 TOTAL NET DISCOUNTED SAVINGS	(2G5 + 3C) =	$31,558
6 SAVINGS-TO-INVESTMENT RATIO (SIR)	(5/1G) =	2.22
7 ADJUSTED INTERNAL RATE OF RETURN (AIRR) - (%)	[(1+.04) x SIR to 1/15 power - 1] x 100 =	9.70

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION: FORT CARSON, COLORADO   REGION: 4   PROJECT NO:
PROJECT TITLE: FT CARSON EEAP UPDATE   FISCAL YEAR: 1992
DISCRETE PORTION NAME: ECO #19 - RADIATOR CONTROLS   BUILDING NO.: S-6223
ANALYSIS DATE: 07/01/93   ECONOMIC LIFE: 15   PREPARED BY: A. NIEMEYER

1 INVESTMENT COSTS

A.	CONSTRUCTION COST	=	$9,476	
B.	SIOH COST	(5.5% of 1A) =	$521	
C.	DESIGN COST	(6.0% of 1A) =	$569	
D.	TOTAL COST	(1A + 1B + 1C) =	$10,566	
E.	SALVAGE VALUE	=	$0	
F.	SALVAGE VALUE OF EXISTING EQUIP.	=	$0	
G.	TOTAL INVESTMENT	(1D - 1E - 1F) =	--------->	$10,566

2 ENERGY SAVINGS (+) or COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS: OCTOBER 1992

	ENERGY SOURCE	COST $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A.	ELEC	$7.32		$0	11.70	$0	
B.	DIST			$0	13.78	$0	
C.	NAT GAS	$3.48	319.30	$1,110	14.16	$15,716	
D.	COAL			$0	11.57	$0	
E.	SOLAR			$0		$0	
F.	DEMAND SAVINGS	$69.68 / year		$0	11.12	$0	
G.	TOTAL		319.30	$1,110		--------->	$15,716

3 NONENERGY SAVINGS (+) or COST (-)

A.	ANNUAL RECURRING			$0
	1 DISCOUNT FACTOR	(From Table A-2) =	11.12	
	2 DISCOUNTED SAVINGS or COST	(3A x 3A1) =		$0

B. NONRECURRING

ITEM	SAVINGS or COST (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3)	DISCOUNTED SVGS or COST (4)
a.	$0	0	0.00	$0
b.	$0	0	0.00	$0
c.	$0	0	0.00	$0
d TOTAL	$0			$0

C. TOTAL NONENERGY DISCOUNTED SAVINGS or COST (3A2 + 3Bd4) = $0

4 SIMPLE PAYBACK (SPB) - (YRS)	1G/(2G3 + 3A + (3Bd1/15)) =	9.5
5 TOTAL NET DISCOUNTED SAVINGS	(2G5 + 3C) =	$15,716
6 SAVINGS-TO-INVESTMENT RATIO (SIR)	(5/1G) =	1.49
7 ADJUSTED INTERNAL RATE OF RETURN (AIRR) - (%)	[(1+.04) x SIR to 1/15 power - 1] x 100 =	6.79

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION:	FORT CARSON, COLORADO	REGION:	4	PROJECT NO:	
PROJECT TITLE:	FT CARSON EEAP UPDATE			FISCAL YEAR:	1992
DISCRETE PORTION NAME:	ECO #19 - RADIATOR CONTROLS			BUILDING NO.:	S-6224
ANALYSIS DATE:	07/01/93	ECONOMIC LIFE:	15	PREPARED BY:	A. NIEMEYER

1 INVESTMENT COSTS

A. CONSTRUCTION COST	=	$22,457		
B. SIOH COST	(5.5% of 1A) =	$1,235		
C. DESIGN COST	(6.0% of 1A) =	$1,347		
D. TOTAL COST	(1A + 1B + 1C) =	$25,039		
E. SALVAGE VALUE	=	$0		
F. SALVAGE VALUE OF EXISTING EQUIP.	=	$0		
G. TOTAL INVESTMENT	(1D - 1E - 1F) =	--------->		$25,039

2 ENERGY SAVINGS (+) or COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS: OCTOBER 1992

ENERGY SOURCE	COST $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A. ELEC	$7.32		$0	11.70	$0	
B. DIST			$0	13.78	$0	
C. NAT GAS	$3.48	818.70	$2,846	14.16	$40,297	
D. COAL			$0	11.57	$0	
E. SOLAR			$0		$0	
F. DEMAND SAVINGS	$69.68 / year		$0	11.12	$0	
G. TOTAL		818.70	$2,846		--------->	$40,297

3 NONENERGY SAVINGS (+) or COST (-)

A. ANNUAL RECURRING			$0	
1 DISCOUNT FACTOR	(From Table A-2) =	11.12		
2 DISCOUNTED SAVINGS or COST	(3A x 3A1) =		$0	

B. NONRECURRING

ITEM	SAVINGS or COST (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3)	DISCOUNTED SVGS or COST (4)	
a.	$0	0	0.00	$0	
b.	$0	0	0.00	$0	
c.	$0	0	0.00	$0	
d TOTAL	$0			$0	
C. TOTAL NONENERGY DISCOUNTED SAVINGS or COST			(3A2 + 3Bd4) =		$0

4 SIMPLE PAYBACK (SPB) - (YRS)	1G/(2G3 + 3A + (3Bd1/15)) =	8.8
5 TOTAL NET DISCOUNTED SAVINGS	(2G5 + 3C) =	$40,297
6 SAVINGS-TO-INVESTMENT RATIO (SIR)	(5/1G) =	1.61
7 ADJUSTED INTERNAL RATE OF RETURN (AIRR) - (%)	[(1+.04) x SIR to 1/15 power - 1] x 100 =	7.35

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION:	FORT CARSON, COLORADO	REGION:	4	PROJECT NO:	
PROJECT TITLE:	FT CARSON EEAP UPDATE			FISCAL YEAR:	1992
DISCRETE PORTION NAME:	ECO #19 - RADIATOR CONTROLS			BUILDING NO.:	S-6236
ANALYSIS DATE:	07/01/93	ECONOMIC LIFE: 15		PREPARED BY:	A. NIEMEYER

1 INVESTMENT COSTS

A. CONSTRUCTION COST	=		$19,471	
B. SIOH COST	(5.5% of 1A) =		$1,071	
C. DESIGN COST	(6.0% of 1A) =		$1,168	
D. TOTAL COST	(1A + 1B + 1C) =		$21,710	
E. SALVAGE VALUE	=		$0	
F. SALVAGE VALUE OF EXISTING EQUIP.	=		$0	
G. TOTAL INVESTMENT	(1D - 1E - 1F) =		--------->	$21,710

2 ENERGY SAVINGS (+) or COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS: OCTOBER 1992

	ENERGY SOURCE	COST $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A.	ELEC	$7.32		$0	11.70	$0	
B.	DIST			$0	13.78	$0	
C.	NAT GAS	$3.48	666.62	$2,317	14.16	$32,811	
D.	COAL			$0	11.57	$0	
E.	SOLAR			$0		$0	
F.	DEMAND SAVINGS	$69.68 / year		$0	11.12	$0	
G.	TOTAL		666.62	$2,317		--------->	$32,811

3 NONENERGY SAVINGS (+) or COST (-)

A. ANNUAL RECURRING			$0
1 DISCOUNT FACTOR	(From Table A-2) =	11.12	
2 DISCOUNTED SAVINGS or COST	(3A x 3A1) =		$0

B. NONRECURRING

ITEM	SAVINGS or COST (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3)	DISCOUNTED SVGS or COST (4)	
a.	$0	0	0.00	$0	
b.	$0	0	0.00	$0	
c.	$0	0	0.00	$0	
d TOTAL	$0			$0	
C. TOTAL NONENERGY DISCOUNTED SAVINGS or COST			(3A2 + 3Bd4) =		$0

4 SIMPLE PAYBACK (SPB) - (YRS)	1G/(2G3 + 3A + (3Bd1/15)) =	9.4
5 TOTAL NET DISCOUNTED SAVINGS	(2G5 + 3C) =	$32,811
6 SAVINGS-TO-INVESTMENT RATIO (SIR)	(5/1G) =	1.51
7 ADJUSTED INTERNAL RATE OF RETURN (AIRR) - (%)	[(1+.04) x SIR to 1/15 power - 1] x 100 =	6.90

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION:	FORT CARSON, COLORADO	REGION:	4	PROJECT NO:	
PROJECT TITLE:	FT CARSON EEAP UPDATE			FISCAL YEAR:	1992
DISCRETE PORTION NAME:	ECO #19 - RADIATOR CONTROLS			BUILDING NO.:	S-6237
ANALYSIS DATE:	07/01/93	ECONOMIC LIFE:	15	PREPARED BY:	A. NIEMEYER

1 INVESTMENT COSTS

A. CONSTRUCTION COST	=		$19,471	
B. SIOH COST	(5.5% of 1A) =		$1,071	
C. DESIGN COST	(6.0% of 1A) =		$1,168	
D. TOTAL COST	(1A + 1B + 1C) =		$21,710	
E. SALVAGE VALUE	=		$0	
F. SALVAGE VALUE OF EXISTING EQUIP.	=		$0	
G. TOTAL INVESTMENT	(1D - 1E - 1F) =		---------->	$21,710

2 ENERGY SAVINGS (+) or COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS: OCTOBER 1992

ENERGY SOURCE	COST $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A. ELEC	$7.32		$0	11.70	$0	
B. DIST			$0	13.78	$0	
C. NAT GAS	$3.48	745.73	$2,592	14.16	$36,705	
D. COAL			$0	11.57	$0	
E. SOLAR			$0		$0	
F. DEMAND SAVINGS	$69.68 / year		$0	11.12	$0	
G. TOTAL		745.73	$2,592		---------->	$36,705

3 NONENERGY SAVINGS (+) or COST (-)

A. ANNUAL RECURRING			$0
1 DISCOUNT FACTOR	(From Table A-2) =	11.12	
2 DISCOUNTED SAVINGS or COST	(3A x 3A1) =		$0

B. NONRECURRING

ITEM	SAVINGS or COST (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3)	DISCOUNTED SVGS or COST (4)	
a.	$0	0	0.00	$0	
b.	$0	0	0.00	$0	
c.	$0	0	0.00	$0	
d TOTAL	$0			$0	
C. TOTAL NONENERGY DISCOUNTED SAVINGS or COST			(3A2 + 3Bd4) =		$0

4 SIMPLE PAYBACK (SPB) - (YRS)	1G/(2G3 + 3A + (3Bd1/15)) =	8.4
5 TOTAL NET DISCOUNTED SAVINGS	(2G5 + 3C) =	$36,705
6 SAVINGS-TO-INVESTMENT RATIO (SIR)	(5/1G) =	1.69
7 ADJUSTED INTERNAL RATE OF RETURN (AIRR) - (%)	[(1+.04) x SIR to 1/15 power - 1] x 100 =	7.71

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION:	FORT CARSON, COLORADO	REGION:	4	PROJECT NO:	
PROJECT TITLE:	FT CARSON EEAP UPDATE			FISCAL YEAR:	1992
DISCRETE PORTION NAME:	ECO #19 - RADIATOR CONTROLS			BUILDING NO.:	S-6243
ANALYSIS DATE:	07/01/93	ECONOMIC LIFE:	15	PREPARED BY:	A. NIEMEYER

1 INVESTMENT COSTS

A. CONSTRUCTION COST	=		$13,370	
B. SIOH COST	(5.5% of 1A) =		$735	
C. DESIGN COST	(6.0% of 1A) =		$802	
D. TOTAL COST	(1A + 1B + 1C) =		$14,908	
E. SALVAGE VALUE	=		$0	
F. SALVAGE VALUE OF EXISTING EQUIP.	=		$0	
G. TOTAL INVESTMENT	(1D - 1E - 1F) =		--------->	$14,908

2 ENERGY SAVINGS (+) or COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS: OCTOBER 1992

ENERGY SOURCE	COST $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A. ELEC	$7.32		$0	11.70	$0	
B. DIST			$0	13.78	$0	
C. NAT GAS	$3.48	850.11	$2,955	14.16	$41,843	
D. COAL			$0	11.57	$0	
E. SOLAR			$0		$0	
F. DEMAND SAVINGS	$69.68 / year		$0	11.12	$0	
G. TOTAL		850.11	$2,955		--------->	$41,843

3 NONENERGY SAVINGS (+) or COST (-)

A. ANNUAL RECURRING			$0
1 DISCOUNT FACTOR	(From Table A-2) =	11.12	
2 DISCOUNTED SAVINGS or COST	(3A x 3A1) =		$0

B. NONRECURRING

ITEM	SAVINGS or COST (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3)	DISCOUNTED SVGS or COST (4)	
a.	$0	0	0.00	$0	
b.	$0	0	0.00	$0	
c.	$0	0	0.00	$0	
d TOTAL	$0			$0	
C. TOTAL NONENERGY DISCOUNTED SAVINGS or COST			(3A2 + 3Bd4) =		$0

4 SIMPLE PAYBACK (SPB) - (YRS)	1G/(2G3 + 3A + (3Bd1/15)) =	5.0
5 TOTAL NET DISCOUNTED SAVINGS	(2G5 + 3C) =	$41,843
6 SAVINGS-TO-INVESTMENT RATIO (SIR)	(5/1G) =	2.81
7 ADJUSTED INTERNAL RATE OF RETURN (AIRR) - (%)	[(1+.04) x SIR to 1/15 power - 1] x 100 =	11.41

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION: FORT CARSON, COLORADO	REGION: 4		PROJECT NO:
PROJECT TITLE: FT CARSON EEAP UPDATE			FISCAL YEAR: 1992
DISCRETE PORTION NAME: ECO #19 - RADIATOR CONTROLS			BUILDING NO.: S-6230
ANALYSIS DATE: 07/01/93	ECONOMIC LIFE: 15		PREPARED BY: A. NIEMEYER

1 INVESTMENT COSTS

A.	CONSTRUCTION COST	=	$15,317	
B.	SIOH COST	(5.5% of 1A) =	$842	
C.	DESIGN COST	(6.0% of 1A) =	$919	
D.	TOTAL COST	(1A + 1B + 1C) =	$17,079	
E.	SALVAGE VALUE	=	$0	
F.	SALVAGE VALUE OF EXISTING EQUIP.	=	$0	
G.	TOTAL INVESTMENT	(1D - 1E - 1F) =	--------->	$17,079

2 ENERGY SAVINGS (+) or COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS: OCTOBER 1992

	ENERGY SOURCE	COST \$/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL \$ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A.	ELEC	$7.32		$0	11.70	$0	
B.	DIST			$0	13.78	$0	
C.	NAT GAS	$3.48	591.45	$2,056	14.16	$29,111	
D.	COAL			$0	11.57	$0	
E.	SOLAR			$0		$0	
F.	DEMAND SAVINGS	$69.68 / year		$0	11.12	$0	
G.	TOTAL		591.45	2,055.9		--------->	$29,111

3 NONENERGY SAVINGS (+) or COST (-)

A. ANNUAL RECURRING			$0	
1 DISCOUNT FACTOR	(From Table A-2) =	11.12		
2 DISCOUNTED SAVINGS or COST	(3A x 3A1) =		$0	

B. NONRECURRING

ITEM	SAVINGS or COST (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3)	DISCOUNTED SVGS or COST (4)	
a.	$0	0	0.00	$0	
b.	$0	0	0.00	$0	
c.	$0	0	0.00	$0	
d TOTAL	$0			$0	
C. TOTAL NONENERGY DISCOUNTED SAVINGS or COST			(3A2 + 3Bd4) =		$0

4 SIMPLE PAYBACK (SPB) - (YRS)	1G/(2G3 + 3A + (3Bd1/15)) =	8.3
5 TOTAL NET DISCOUNTED SAVINGS	(2G5 + 3C) =	$29,111
6 SAVINGS-TO-INVESTMENT RATIO (SIR)	(5/1G) =	1.70
7 ADJUSTED INTERNAL RATE OF RETURN (AIRR) - (%)	[(1+.04) x SIR to 1/15 power - 1] x 100 =	7.76

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION:	FORT CARSON, COLORADO	REGION:	4	PROJECT NO:	
PROJECT TITLE:	FT CARSON EEAP UPDATE			FISCAL YEAR:	1992
DISCRETE PORTION NAME:	ECO #19 - RADIATOR CONTROLS			BUILDING NO.:	S-6231
ANALYSIS DATE:	07/01/93	ECONOMIC LIFE: 15		PREPARED BY:	A. NIEMEYER

1 INVESTMENT COSTS

A. CONSTRUCTION COST	=	$13,370		
B. SIOH COST	(5.5% of 1A) =	$735		
C. DESIGN COST	(6.0% of 1A) =	$802		
D. TOTAL COST	(1A + 1B + 1C) =	$14,908		
E. SALVAGE VALUE	=	$0		
F. SALVAGE VALUE OF EXISTING EQUIP.	=	$0		
G. TOTAL INVESTMENT	(1D - 1E - 1F) =	--------->	$14,908	

2 ENERGY SAVINGS (+) or COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS: OCTOBER 1992

	ENERGY SOURCE	COST $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A.	ELEC	$7.32		$0	11.70	$0	
B.	DIST			$0	13.78	$0	
C.	NAT GAS	$3.48	553.54	$1,924	14.16	$27,245	
D.	COAL			$0	11.57	$0	
E.	SOLAR			$0		$0	
F.	DEMAND SAVINGS	$69.68 / year		$0	11.12	$0	
G.	TOTAL		553.54	$1,924		--------->	$27,245

3 NONENERGY SAVINGS (+) or COST (-)

A. ANNUAL RECURRING			$0
1 DISCOUNT FACTOR	(From Table A-2) =	11.12	
2 DISCOUNTED SAVINGS or COST	(3A x 3A1) =		$0

B. NONRECURRING

ITEM	SAVINGS or COST (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3)	DISCOUNTED SVGS or COST (4)
a.	$0	0	0.00	$0
b.	$0	0	0.00	$0
c.	$0	0	0.00	$0
d TOTAL	$0			$0

C. TOTAL NONENERGY DISCOUNTED SAVINGS or COST (3A2 + 3Bd4) = $0

4 SIMPLE PAYBACK (SPB) - (YRS)	1G/(2G3 + 3A + (3Bd1/15)) =	7.7
5 TOTAL NET DISCOUNTED SAVINGS	(2G5 + 3C) =	$27,245
6 SAVINGS-TO-INVESTMENT RATIO (SIR)	(5/1G) =	1.83
7 ADJUSTED INTERNAL RATE OF RETURN (AIRR) - (%)	[(1+.04) x SIR to 1/15 power - 1] x 100 =	8.27

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION:	FORT CARSON, COLORADO	REGION:	4	PROJECT NO:	
PROJECT TITLE:	FT CARSON EEAP UPDATE			FISCAL YEAR:	1992
DISCRETE PORTION NAME:	ECO #19 - RADIATOR CONTROLS			BUILDING NO.:	S-6235
ANALYSIS DATE:	07/01/93	ECONOMIC LIFE:	15	PREPARED BY:	A. NIEMEYER

1 INVESTMENT COSTS

A. CONSTRUCTION COST	=	$13,370	
B. SIOH COST	(5.5% of 1A) =	$735	
C. DESIGN COST	(6.0% of 1A) =	$802	
D. TOTAL COST	(1A + 1B + 1C) =	$14,908	
E. SALVAGE VALUE	=	$0	
F. SALVAGE VALUE OF EXISTING EQUIP.	=	$0	
G. TOTAL INVESTMENT	(1D - 1E - 1F) =	--------->	$14,908

2 ENERGY SAVINGS (+) or COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS: OCTOBER 1992

ENERGY SOURCE	COST \$/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL \$ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A. ELEC	$7.32		$0	11.70	$0	
B. DIST			$0	13.78	$0	
C. NAT GAS	$3.48	553.54	$1,924	14.16	$27,245	
D. COAL			$0	11.57	$0	
E. SOLAR			$0		$0	
F. DEMAND SAVINGS	$69.68 / year		$0	11.12	$0	
G. TOTAL		553.54	$1,924		--------->	$27,245

3 NONENERGY SAVINGS (+) or COST (-)

A. ANNUAL RECURRING			$0
1 DISCOUNT FACTOR	(From Table A-2) =	11.12	
2 DISCOUNTED SAVINGS or COST	(3A x 3A1) =		$0

B. NONRECURRING

ITEM	SAVINGS or COST (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3)	DISCOUNTED SVGS or COST (4)
a.	$0	0	0.00	$0
b.	$0	0	0.00	$0
c.	$0	0	0.00	$0
d TOTAL	$0			$0

C. TOTAL NONENERGY DISCOUNTED SAVINGS or COST (3A2 + 3Bd4) = $0

4 SIMPLE PAYBACK (SPB) - (YRS)	1G/(2G3 + 3A + (3Bd1/15)) =	7.7
5 TOTAL NET DISCOUNTED SAVINGS	(2G5 + 3C) =	$27,245
6 SAVINGS-TO-INVESTMENT RATIO (SIR)	(5/1G) =	1.83
7 ADJUSTED INTERNAL RATE OF RETURN (AIRR) - (%)	[(1+.04) x SIR to 1/15 power - 1] x 100 =	8.27

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION: FORT CARSON, COLORADO REGION: 4 PROJECT NO:
PROJECT TITLE: FT CARSON EEAP UPDATE FISCAL YEAR: 1992
DISCRETE PORTION NAME: ECO #19 - RADIATOR CONTROLS BUILDING NO.: S-6240
ANALYSIS DATE: 07/01/93 ECONOMIC LIFE: 15 PREPARED BY: A. NIEMEYER

1 INVESTMENT COSTS

A. CONSTRUCTION COST	=	$15,447	
B. SIOH COST	(5.5% of 1A) =	$850	
C. DESIGN COST	(6.0% of 1A) =	$927	
D. TOTAL COST	(1A + 1B + 1C) =	$17,224	
E. SALVAGE VALUE	=	$0	
F. SALVAGE VALUE OF EXISTING EQUIP.	=	$0	
G. TOTAL INVESTMENT	(1D - 1E - 1F) =	--------->	$17,224

2 ENERGY SAVINGS (+) or COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS: OCTOBER 1992

ENERGY SOURCE	COST $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A. ELEC	$7.32		$0	11.70	$0	
B. DIST			$0	13.78	$0	
C. NAT GAS	$3.48	550.61	$1,914	14.16	$27,101	
D. COAL			$0	11.57	$0	
E. SOLAR			$0		$0	
F. DEMAND SAVINGS	$69.68 / year		$0	11.12	$0	
G. TOTAL		550.61	$1,914		--------->	$27,101

3 NONENERGY SAVINGS (+) or COST (-)

A. ANNUAL RECURRING			$0	
1 DISCOUNT FACTOR	(From Table A-2) =	11.12		
2 DISCOUNTED SAVINGS or COST	(3A x 3A1) =		$0	

B. NONRECURRING

ITEM	SAVINGS or COST (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3)	DISCOUNTED SVGS or COST (4)
a.	$0	0	0.00	$0
b.	$0	0	0.00	$0
c.	$0	0	0.00	$0
d TOTAL	$0			$0

C. TOTAL NONENERGY DISCOUNTED SAVINGS or COST (3A2 + 3Bd4) = $0

4 SIMPLE PAYBACK (SPB) - (YRS)	1G/(2G3 + 3A + (3Bd1/15)) =	9.0
5 TOTAL NET DISCOUNTED SAVINGS	(2G5 + 3C) =	$27,101
6 SAVINGS-TO-INVESTMENT RATIO (SIR)	(5/1G) =	1.57
7 ADJUSTED INTERNAL RATE OF RETURN (AIRR) - (%)	[(1+.04) x SIR to 1/15 power - 1] x 100 =	7.19

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION: FORT CARSON, COLORADO REGION: 4 PROJECT NO:
PROJECT TITLE: FT CARSON EEAP UPDATE FISCAL YEAR: 1992
DISCRETE PORTION NAME: ECO #19 - RADIATOR CONTROLS BUILDING NO.: S-6241
ANALYSIS DATE: 07/01/93 ECONOMIC LIFE: 15 PREPARED BY: A. NIEMEYER

1 INVESTMENT COSTS

A.	CONSTRUCTION COST	=	$13,370	
B.	SIOH COST	(5.5% of 1A) =	$735	
C.	DESIGN COST	(6.0% of 1A) =	$802	
D.	TOTAL COST	(1A + 1B + 1C) =	$14,908	
E.	SALVAGE VALUE	=	$0	
F.	SALVAGE VALUE OF EXISTING EQUIP.	=	$0	
G.	TOTAL INVESTMENT	(1D - 1E - 1F) =	---------->	$14,908

2 ENERGY SAVINGS (+) or COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS: OCTOBER 1992

	ENERGY SOURCE	COST $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A.	ELEC	$7.32		$0	11.70	$0	
B.	DIST			$0	13.78	$0	
C.	NAT GAS	$3.48	553.54	$1,924	14.16	$27,245	
D.	COAL			$0	11.57	$0	
E.	SOLAR			$0		$0	
F.	DEMAND SAVINGS	$69.68 / year		$0	11.12	$0	
G.	TOTAL		553.54	$1,924		---------->	$27,245

3 NONENERGY SAVINGS (+) or COST (-)

A.	ANNUAL RECURRING			$0
	1 DISCOUNT FACTOR	(From Table A-2) =	11.12	
	2 DISCOUNTED SAVINGS or COST	(3A x 3A1) =		$0

B. NONRECURRING

ITEM	SAVINGS or COST (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3)	DISCOUNTED SVGS or COST (4)
a.	$0	0	0.00	$0
b.	$0	0	0.00	$0
c.	$0	0	0.00	$0
d TOTAL	$0			$0

C. TOTAL NONENERGY DISCOUNTED SAVINGS or COST (3A2 + 3Bd4) = $0

4 SIMPLE PAYBACK (SPB) - (YRS)	1G/(2G3 + 3A + (3Bd1/15)) =	7.7
5 TOTAL NET DISCOUNTED SAVINGS	(2G5 + 3C) =	$27,245
6 SAVINGS-TO-INVESTMENT RATIO (SIR)	(5/1G) =	1.83
7 ADJUSTED INTERNAL RATE OF RETURN (AIRR) - (%)	[(1+.04) x SIR to 1/15 power - 1] x 100 =	8.27

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION: FORT CARSON, COLORADO	REGION: 4	PROJECT NO:	
PROJECT TITLE: FT CARSON EEAP UPDATE		FISCAL YEAR:	1992
DISCRETE PORTION NAME: ECO #19 - RADIATOR CONTROLS		BUILDING NO.:	S-6244
ANALYSIS DATE: 07/01/93	ECONOMIC LIFE: 15	PREPARED BY:	A. NIEMEYER

1 INVESTMENT COSTS

A.	CONSTRUCTION COST	=	$10,385	
B.	SIOH COST	(5.5% of 1A) =	$571	
C.	DESIGN COST	(6.0% of 1A) =	$623	
D.	TOTAL COST	(1A + 1B + 1C) =	$11,579	
E.	SALVAGE VALUE	=	$0	
F.	SALVAGE VALUE OF EXISTING EQUIP.	=	$0	
G.	TOTAL INVESTMENT	(1D - 1E - 1F) =	---------->	$11,579

2 ENERGY SAVINGS (+) or COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS: OCTOBER 1992

	ENERGY SOURCE	COST $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A.	ELEC	$7.32		$0	11.70	$0	
B.	DIST			$0	13.78	$0	
C.	NAT GAS	$3.48	590.24	$2,052	14.16	$29,052	
D.	COAL			$0	11.57	$0	
E.	SOLAR			$0		$0	
F.	DEMAND SAVINGS	$69.68 / year		$0	11.12	$0	
G.	TOTAL		590.24	$2,052		---------->	$29,052

3 NONENERGY SAVINGS (+) or COST (-)

A. ANNUAL RECURRING			$0	
1 DISCOUNT FACTOR	(From Table A-2) =	11.12		
2 DISCOUNTED SAVINGS or COST	(3A x 3A1) =		$0	

B. NONRECURRING

ITEM	SAVINGS or COST (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3)	DISCOUNTED SVGS or COST (4)	
a.	$0	0	0.00	$0	
b.	$0	0	0.00	$0	
c.	$0	0	0.00	$0	
d TOTAL	$0			$0	
C. TOTAL NONENERGY DISCOUNTED SAVINGS or COST			(3A2 + 3Bd4) =		$0

4 SIMPLE PAYBACK (SPB) - (YRS)	1G/(2G3 + 3A + (3Bd1/15)) =	5.6
5 TOTAL NET DISCOUNTED SAVINGS	(2G5 + 3C) =	$29,052
6 SAVINGS-TO-INVESTMENT RATIO (SIR)	(5/1G) =	2.51
7 ADJUSTED INTERNAL RATE OF RETURN (AIRR) - (%)	[(1+.04) x SIR to 1/15 power - 1] x 100 =	10.58

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION:	FORT CARSON, COLORADO	REGION:	4	PROJECT NO:	
PROJECT TITLE:	FT CARSON EEAP UPDATE			FISCAL YEAR:	1992
DISCRETE PORTION NAME:	ECO #19 - RADIATOR CONTROLS			BUILDING NO.:	S-6252
ANALYSIS DATE:	07/01/93	ECONOMIC LIFE:	15	PREPARED BY:	A. NIEMEYER

1 INVESTMENT COSTS

A. CONSTRUCTION COST	=	$14,279		
B. SIOH COST	(5.5% of 1A) =	$785		
C. DESIGN COST	(6.0% of 1A) =	$857		
D. TOTAL COST	(1A + 1B + 1C) =	$15,921		
E. SALVAGE VALUE	=	$0		
F. SALVAGE VALUE OF EXISTING EQUIP.	=	$0		
G. TOTAL INVESTMENT	(1D - 1E - 1F) =	---------->	$15,921	

2 ENERGY SAVINGS (+) or COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS: OCTOBER 1992

ENERGY SOURCE	COST $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A. ELEC	$7.32		$0	11.70	$0	
B. DIST			$0	13.78	$0	
C. NAT GAS	$3.48	589.55	$2,049	14.16	$29,018	
D. COAL			$0	11.57	$0	
E. SOLAR			$0		$0	
F. DEMAND SAVINGS	$69.68 / year		$0	11.12	$0	
G. TOTAL		589.55	$2,049		--------->	$29,018

3 NONENERGY SAVINGS (+) or COST (-)

A. ANNUAL RECURRING			$0	
1 DISCOUNT FACTOR	(From Table A-2) =	11.12		
2 DISCOUNTED SAVINGS or COST	(3A x 3A1) =		$0	

B. NONRECURRING

ITEM	SAVINGS or COST (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3)	DISCOUNTED SVGS or COST (4)
a.	$0	0	0.00	$0
b.	$0	0	0.00	$0
c.	$0	0	0.00	$0
d TOTAL	$0			$0

C. TOTAL NONENERGY DISCOUNTED SAVINGS or COST (3A2 + 3Bd4) = $0

4 SIMPLE PAYBACK (SPB) - (YRS)	1G/(2G3 + 3A + (3Bd1/15)) =	7.8
5 TOTAL NET DISCOUNTED SAVINGS	(2G5 + 3C) =	$29,018
6 SAVINGS-TO-INVESTMENT RATIO (SIR)	(5/1G) =	1.82
7 ADJUSTED INTERNAL RATE OF RETURN (AIRR) - (%)	[(1+.04) x SIR to 1/15 power - 1] x 100 =	8.25

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION: FORT CARSON, COLORADO REGION: 4 PROJECT NO:
PROJECT TITLE: FT CARSON EEAP UPDATE FISCAL YEAR: 1992
DISCRETE PORTION NAME: ECO #19 - RADIATOR CONTROLS BUILDING NO.: S-6254
ANALYSIS DATE: 07/01/93 ECONOMIC LIFE: 15 PREPARED BY: A. NIEMEYER

1 INVESTMENT COSTS

A.	CONSTRUCTION COST	=	$13,370	
B.	SIOH COST	(5.5% of 1A) =	$735	
C.	DESIGN COST	(6.0% of 1A) =	$802	
D.	TOTAL COST	(1A + 1B + 1C) =	$14,908	
E.	SALVAGE VALUE	=	$0	
F.	SALVAGE VALUE OF EXISTING EQUIP.	=	$0	
G.	TOTAL INVESTMENT	(1D - 1E - 1F) =	--------->	$14,908

2 ENERGY SAVINGS (+) or COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS: OCTOBER 1992

	ENERGY SOURCE	COST \$/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL \$ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A.	ELEC	$7.32		$0	11.70	$0	
B.	DIST			$0	13.78	$0	
C.	NAT GAS	$3.48	553.54	$1,924	14.16	$27,245	
D.	COAL			$0	11.57	$0	
E.	SOLAR			$0		$0	
F.	DEMAND SAVINGS	$69.68 / year		$0	11.12	$0	
G.	TOTAL		553.54	$1,924		--------->	$27,245

3 NONENERGY SAVINGS (+) or COST (-)

A.	ANNUAL RECURRING			$0
	1 DISCOUNT FACTOR	(From Table A-2) =	11.12	
	2 DISCOUNTED SAVINGS or COST	(3A x 3A1) =		$0

B. NONRECURRING

ITEM	SAVINGS or COST (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3)	DISCOUNTED SVGS or COST (4)
a.	$0	0	0.00	$0
b.	$0	0	0.00	$0
c.	$0	0	0.00	$0
d TOTAL	$0			$0

C. TOTAL NONENERGY DISCOUNTED SAVINGS or COST (3A2 + 3Bd4) = $0

4 SIMPLE PAYBACK (SPB) - (YRS)	1G/(2G3 + 3A + (3Bd1/15)) =	7.7
5 TOTAL NET DISCOUNTED SAVINGS	(2G5 + 3C) =	$27,245
6 SAVINGS-TO-INVESTMENT RATIO (SIR)	(5/1G) =	1.83
7 ADJUSTED INTERNAL RATE OF RETURN (AIRR) - (%)	[(1+.04) x SIR to 1/15 power - 1] x 100 =	8.27

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION: FORT CARSON, COLORADO	REGION: 4	PROJECT NO:	
PROJECT TITLE: FT CARSON EEAP UPDATE		FISCAL YEAR:	1992
DISCRETE PORTION NAME: ECO #19 - RADIATOR CONTROLS		BUILDING NO.:	S-6255
ANALYSIS DATE: 07/01/93	ECONOMIC LIFE: 15	PREPARED BY:	A. NIEMEYER

1 INVESTMENT COSTS

A.	CONSTRUCTION COST	=	$20,120	
B.	SIOH COST	(5.5% of 1A) =	$1,107	
C.	DESIGN COST	(6.0% of 1A) =	$1,207	
D.	TOTAL COST	(1A + 1B + 1C) =	$22,434	
E.	SALVAGE VALUE	=	$0	
F.	SALVAGE VALUE OF EXISTING EQUIP.	=	$0	
G.	TOTAL INVESTMENT	(1D - 1E - 1F) =	--------->	$22,434

2 ENERGY SAVINGS (+) or COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS: OCTOBER 1992

	ENERGY SOURCE	COST $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A.	ELEC	$7.32		$0	11.70	$0	
B.	DIST			$0	13.78	$0	
C.	NAT GAS	$3.48	691.49	$2,404	14.16	$34,035	
D.	COAL			$0	11.57	$0	
E.	SOLAR			$0		$0	
F.	DEMAND SAVINGS	$69.68 / year		$0	11.12	$0	
G.	TOTAL		691.49	$2,404		--------->	$34,035

3 NONENERGY SAVINGS (+) or COST (-)

A. ANNUAL RECURRING			$0	
1 DISCOUNT FACTOR	(From Table A-2) =	11.12		
2 DISCOUNTED SAVINGS or COST	(3A x 3A1) =		$0	

B. NONRECURRING

ITEM	SAVINGS or COST (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3)	DISCOUNTED SVGS or COST (4)	
a.	$0	0	0.00	$0	
b.	$0	0	0.00	$0	
c.	$0	0	0.00	$0	
d TOTAL	$0			$0	
C. TOTAL NONENERGY DISCOUNTED SAVINGS or COST			(3A2 + 3Bd4) =		$0

4 SIMPLE PAYBACK (SPB) - (YRS)	1G/(2G3 + 3A + (3Bd1/15)) =	9.3
5 TOTAL NET DISCOUNTED SAVINGS	(2G5 + 3C) =	$34,035
6 SAVINGS-TO-INVESTMENT RATIO (SIR)	(5/1G) =	1.52
7 ADJUSTED INTERNAL RATE OF RETURN (AIRR) - (%)	[(1+.04) x SIR to 1/15 power - 1] x 100 =	6.93

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION: FORT CARSON, COLORADO	REGION: 4	PROJECT NO:	
PROJECT TITLE: FT CARSON EEAP UPDATE		FISCAL YEAR:	1992
DISCRETE PORTION NAME: ECO #19 - RADIATOR CONTROLS		BUILDING NO.:	ALL BLDGS
ANALYSIS DATE: 07/01/93	ECONOMIC LIFE: 15	PREPARED BY:	A. NIEMEYER

1 INVESTMENT COSTS

A. CONSTRUCTION COST	=		$236,769	
B. SIOH COST	(5.5% of 1A) =		$13,022	
C. DESIGN COST	(6.0% of 1A) =		$14,206	
D. TOTAL COST	(1A + 1B + 1C) =		$263,997	
E. SALVAGE VALUE	=		$0	
F. SALVAGE VALUE OF EXISTING EQUIP.	=		$0	
G. TOTAL INVESTMENT	(1D - 1E - 1F) =		--------->	$263,997

2 ENERGY SAVINGS (+) or COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS: OCTOBER 1992

ENERGY SOURCE	COST $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A. ELEC	$7.32		$0	11.70	$0	
B. DIST			$0	13.78	$0	
C. NAT GAS	$3.48	9874.72	$34,325	14.16	$486,035	
D. COAL			$0	11.57	$0	
E. SOLAR			$0		$0	
F. DEMAND SAVINGS	$69.68 / year		$0	11.12	$0	
G. TOTAL		9874.72	34,324.5		--------->	$486,035

3 NONENERGY SAVINGS (+) or COST (-)

A. ANNUAL RECURRING			$0
1 DISCOUNT FACTOR	(From Table A-2) =	11.12	
2 DISCOUNTED SAVINGS or COST	(3A x 3A1) =		$0

B. NONRECURRING

ITEM	SAVINGS or COST (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3)	DISCOUNTED SVGS or COST (4)	
a.	$0	0	0.00	$0	
b.	$0	0	0.00	$0	
c.	$0	0	0.00	$0	
d TOTAL	$0			$0	
C. TOTAL NONENERGY DISCOUNTED SAVINGS or COST			(3A2 + 3Bd4) =		$0

4 SIMPLE PAYBACK (SPB) - (YRS)	1G/(2G3 + 3A + (3Bd1/15)) =	7.7
5 TOTAL NET DISCOUNTED SAVINGS	(2G5 + 3C) =	$486,035
6 SAVINGS-TO-INVESTMENT RATIO (SIR)	(5/1G) =	1.84
7 ADJUSTED INTERNAL RATE OF RETURN (AIRR) - (%)	[(1+.04) x SIR to 1/15 power - 1] x 100 =	8.32

CONSTRUCTION COST ESTIMATE

DATE PREPARED 13-Apr-93

SHEET 1 **OF** 1

Project
FT CARSON EEAP UPDATE

Location
FORT CARSON, COLORADO

Architect-Engineer
E M C ENGINEERS, INC., 2750 S. WADSWORTH BLVD., DENVER, CO 80227

Drawing No.

Estimator
A. NIEMEYER

BASIS FOR ESTIMATE

X	Code A (No design completed)
__	Code B (Preliminary design)
__	Code C (Final design)
__	Other (Specify)________

Checked by
T. FORSTER

ECO #19 Radiator Controls	Quantity No. Units	Quantity Unit Meas.	Labor Per Unit	Labor Total	Material Per Unit	Material Total	Total Cost
Remove Existing Rad. Control Valve	1	EA	5.70	5.70			$5.70
Install Thermostatic Control Valve	1	EA	22.81	22.81	61.46	61.46	$84.27
with Operator (16' capillary tube extension)							
Subtotal - Direct Costs per Installation				28.51		61.46	89.97
Overhead, Bond, Ins. (16.8%)							$15.11
Workers Comp. Ins. (7.7%)							$2.20
Profit (10%)							$10.73
Contingency (10%)							$11.80
TOTAL PER UNIT							$129.81

BUILDING NO.	No. Units	Unit Meas.	Labor and Material with Overhead, Profit, and Cont.			Total	Total Contract Cost
S-6220	52	EA				$129.81	$6,749.99
S-6221	31	EA				$129.81	$4,024.03
S-6222	98	EA				$129.81	$12,721.14
S-6223	73	EA				$129.81	$9,475.95
S-6224	173	EA				$129.81	$22,456.71
S-6236	150	EA				$129.81	$19,471.14
S-6237	150	EA				$129.81	$19,471.14
S-6243	103	EA				$129.81	$13,370.18
S-6230	118	EA				$129.81	$15,317.29
S-6231	103	EA				$129.81	$13,370.18
S-6235	103	EA				$129.81	$13,370.18
S-6240	119	EA				$129.81	$15,447.10
S-6241	103	EA				$129.81	$13,370.18
S-6244	80	EA				$129.81	$10,384.61
S-6252	110	EA				$129.81	$14,278.83
S-6254	103	EA				$129.81	$13,370.18
S-6255	155	EA				$129.81	$20,120.17
TOTAL ECO #19							$236,769.00

ENG FORM 150
1 AUG 59

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EMC ENGINEERS, INC.
ENERGY SAVINGS ESTIMATE - ECO #19 UPGRADE RADIATOR CONTROLS

PROJECT:	UPDATE EXISTING EEAP STUDY	CLIENT PROJECT ENG:	R.W. WHITE
LOCATION:	FORT CARSON, COLORADO	CLIENT PROJECT NO:	
PHASE:	FINAL	EMC PROJECT NO:	2102-001
PREPARED BY:	A. NIEMEYER	DATE:	01-Jul-93

PRIMARY BLDG. NO.	ENERGY SAVINGS (MBTU/YR)	NO. OF RAD.	BLDG. (SF)	ENERGY SAVINGS PER SF (MBTU/YR)
S-6220	412.25	52	12361	0.0334

BLDG. NO.	NO. OF RAD.	BLDG. (SF)	ENERGY SAVINGS PER SF (MBTU/YR)	TOTAL ENERGY SAVINGS (MBTU/YR)
S-6221	31	5798	0.0334	193.37
S-6222	98	19225	0.0334	641.17
S-6223	73	9574	0.0334	319.30
S-6224	173	24548	0.0334	818.70
S-6236	150	19988	0.0334	666.62
S-6237	150	22360	0.0334	745.73
S-6243	103	25490	0.0334	850.11

PRIMARY BLDG. NO.	ENERGY SAVINGS (MBTU/YR)	NO. OF RAD.	BLDG. (SF)	ENERGY SAVINGS PER SF (MBTU/YR)
S-6230	591.45	118	21450	0.0276

BLDG. NO.	NO. OF RAD.	BLDG. (SF)	ENERGY SAVINGS PER SF (MBTU/YR)	TOTAL ENERGY SAVINGS (MBTU/YR)
S-6231	103	20075	0.0276	553.54
S-6235	103	20075	0.0276	553.54
S-6240	119	19969	0.0276	550.61
S-6241	103	20075	0.0276	553.54
S-6244	80	21406	0.0276	590.24
S-6252	110	21381	0.0276	589.55
S-6254	103	20075	0.0276	553.54
S-6255	155	25078	0.0276	691.49

TOTAL ENERGY SAVINGS FOR ECO #19 (MBTU/YR) 9874.72

BCEP INPUT FORM

EMC ENGINEERS, INC. DENVER, COLORADO

CASE TYPE NEW (1) EXISTING (2)	EXISTING INPUT FILE (XXXXXX.IN)	BIN CHART FOR THIS RUN (XBINXX.XX)
2	6220.IN	FCBIN.2

PROJECT DESCRIPTION (20 CHAR)	CASE DESCRIPTION (20 CHAR)	CASE or ECM #	DATE (mm/dd/yy)
FT CARSON UPDATE EEAP	BASELINE	Ø	6/28/93

PREPARED BY: (6C)	BUILDING NAME: (6C)	TOTAL FLOOR AREA (R)	# OF ZONES (I)	ZONE NUMBER (I)	FAN SYSTEM Y N
AJN	S-6220	12,361.0	1	1	N

HEATING	MONTH ON (00-12) (I)	MONTH OFF (01-12) (I)	DD CORR. FACTOR (R)	FUEL TYPE (I)	EQPT. CAPACITY (R)	# PART LOAD PTS 2 MIN 11 MAX
	9	5	1.0	3	624,000	2

PART LOAD POINTS (R)	1	2	3	4	5	6	7	8	9	10	11
	.10	1.0									

EFFICIENCY POINTS (R)	1	2	3	4	5	6	7	8	9	10	11
	.69	.69									

COOLING	MONTH ON (00-12) (I)	MONTH OFF (01-12) (I)	FUEL TYPE (I)	EQPT. CAPACITY (R)	# PART LOAD PTS. 2 MIN 11 MAX
	Ø	Ø	Ø	Ø	Ø

PART LOAD POINTS	1	2	3	4	5	6	7	8	9	10	11

EFFICIENCY POINTS	1	2	3	4	5	6	7	8	9	10	11

BIN Nº HEATING BEGINS (I)	BIN Nº COOLING BEGINS (I)	HEAT NON-WORK HOURS ? Y N	COOL NON-WORK HOURS ? Y N
17	Ø	Y	N

CONDUCTION	RUN THIS ZONE ? Y N	SOLAR RAD DISK FILE:
	Y	SOLAR.N

WALLS	NORTH	EAST	SOUTH	WEST	ROOF
AREA (R)	2995.2	578.8	3006.8	631.0	5747.0
U-VALUE (R)	0.24	0.24	0.24	0.24	0.069
COLOR ADJUSTMENT FACTOR (R)	0.65	0.65	0.65	0.65	0.8
CLTD (I)	Ø	Ø	Ø	Ø	Ø
EXTERNAL SHADE FACTOR (R)	0.3	0.9	0.9	1.0	1.0

ATTIC VENTILATION ? Y N	PERCENT POSSIBLE SUMMER SUNSHINE (R)	PERCENT POSSIBLE WINTER SUNSHINE (R)
N	67.0	66.0

GLASS (VERTICAL)	N	NE	E	SE	S	SW	W	NW	SKYLIGHT or ROOF GLASS
AREA (R)	434.8		359.2		423.2		307.0		
U-FACTOR (R)	0.568		0.568		0.568		0.568		
SHADING COEFFICIENT (R)	0.88		0.88		0.88		0.88		
COOLING LOAD FACTOR (R)	11.53		5.47		6.43		5.47		
MAX SHGF, SUMMER (I)	38		216		109		216		
MAX SHGF, WINTER (I)	20		154		254		154		
EXTERNAL SHADE FACTOR (R)	0.30		0.9		0.9		1.0		

FLOOR TYPE 0: NONE 1: PERIM. 2: CRAWL	(2) FLOOR AREA (R)	(2) FLOOR U-VALUE (R)	CRAWL SPACE TEMPERATURE (R)	EXPOSED PERIMETER LENGTH (R)
2	5747.0	0.1453	S 50.0 W 50.0	—

TEMP RANGE (I)	DESIGN DAY TEMPERATURE (R)	SPACE HEATING TEMPERATURE (R)	SPACE COOLING TEMPERATURE (R)
30	S 91.0 W -3.0	D 78.0 N 78.0	D — N —

CONVECTION Y N	ELEVATION	AIR FLOW RATES-OCCUP / UNOCUP	HEATING AIR TEMP (R)	COOLING AIR TEMP (R)
Y	5840.0	3420 ACFM(R) 3248 ACFM(R)	D 78.0 N 78.0	D — N —

INTERNAL GAINS	RUN THIS ZONE ? Y N	Nº of TYPES ? (I)
	Y	

INTERNAL GAINS TYPES		DHW (1)	LIGHTS (2)	APPLIANCES (3)	MISC. (4)	PEOPLE (5)
DAY: FUEL TYPE	(I)	3	1		1	
BTUH / UNIT	(R)	4577.0	39,229.0		29,421.0	255.0
NUMBER OF UNITS	(I)	1	1		1	6
SPACE LOAD FACTOR	(R)	0.001	0.9		1.0	1.0
SCHEDULE CORRECTION FACTOR	(R)	1.0	1.0		1.0	1.0
NIGHT: BTUH / UNIT	(R)	4577.0	39,229.0		29,421.0	Ø
NUMBER OF UNITS	(I)	1	1		1	Ø
SPACE LOAD FACTOR	(R)	0.001	0.9		1.0	1.0
SCHEDULE CORRECTION FACTOR	(R)	0.001	0.1		0.05	Ø
EFFICIENCY	(R)	68.86	100.0		100.0	

INPUT FILE (XXXXXX.IN) 6220.IN OUTPUT FILE (XXXXXX.RPT) 6220.RPT

PROJECT--FT CARSON UPDATE EEAP

BUILDING--S-6220
CASE--BASELINE
DATE--6/28/93
PREPARED BY--AJN

ZONE # 1
CASE #0

******************** BIN HEATING AND COOLING ********************
******************** LOADS REPORT ********************
******************** BUILDING BOUNDARY ********************

BIN F	HOURS 7-16	HOURS 17- 6	MECH HEATING LOADS 7 - 16 MBTU	MECH HEATING LOADS 17 - 6 MBTU	MECH COOLING LOADS 7 - 16 MBTU	MECH COOLING LOADS 17 - 6 MBTU
-25 to -20	0	0	.0000	.0000	.0000	.0000
-20 to -15	0	0	.0000	.0000	.0000	.0000
-15 to -10	0	0	.0000	.0000	.0000	.0000
-10 to -5	0	2	.0000	1.0242	.0000	.0000
-5 to 0	0	8	.0000	3.8620	.0000	.0000
0 to 5	15	94	5.7100	42.6010	.0000	.0000
5 to 10	17	121	5.9703	51.3590	.0000	.0000
10 to 15	37	168	11.9130	66.4750	.0000	.0000
15 to 20	55	303	16.0940	111.0400	.0000	.0000
20 to 25	97	376	25.5560	126.8000	.0000	.0000
25 to 30	112	486	26.1580	149.5800	.0000	.0000
30 to 35	94	353	19.1950	98.2880	.0000	.0000
35 to 40	144	407	25.1560	100.6500	.0000	.0000
40 to 45	135	493	19.5300	102.4800	.0000	.0000
45 to 50	181	594	19.9280	100.7800	.0000	.0000
50 to 55	175	556	13.4600	70.7110	.0000	.0000
55 to 60	178	563	8.9795	44.4390	.0000	.0000
60 to 65	192	621	.0000	.0000	.0000	.0000
65 to 70	210	521	.0000	.0000	.0000	.0000
70 to 75	193	327	.0000	.0000	.0000	.0000
75 to 80	192	220	.0000	.0000	.0000	.0000
80 to 85	163	114	.0000	.0000	.0000	.0000
85 to 90	135	74	.0000	.0000	.0000	.0000
90 to 95	15	19	.0000	.0000	.0000	.0000
95 to 100	0	0	.0000	.0000	.0000	.0000
100 to 105	0	0	.0000	.0000	.0000	.0000
ANN	2340	6420	197.6497	1070.0880	.0000	.0000

PROJECT--FT CARSON UPDATE EEAP

BUILDING--S-6220
CASE--BASELINE
DATE--6/28/93
PREPARED BY--AJN

ZONE # 1
CASE #0

******************** MONTHLY HEATING AND COOLING ********************
******************** LOADS REPORT ********************
******************** BUILDING BOUNDARY ********************

MONTH	MECH HEATING LOADS 7 - 16 MBTU	MECH HEATING LOADS 17 - 6 MBTU	MECH COOLING LOADS 7 - 16 MBTU	MECH COOLING LOADS 17 - 6 MBTU
01 JAN	39.8750	178.6100	.0000	.0000
02 FEB	36.2680	160.4200	.0000	.0000
03 MAR	27.5090	146.0200	.0000	.0000
04 APR	15.4900	95.5310	.0000	.0000
05 MAY	6.7159	65.5710	.0000	.0000
06 JUN	.0000	.0000	.0000	.0000
07 JUL	.0000	.0000	.0000	.0000
08 AUG	.0000	.0000	.0000	.0000
09 SEP	2.5831	44.9660	.0000	.0000
10 OCT	5.8988	88.7290	.0000	.0000
11 NOV	33.5350	141.7400	.0000	.0000
12 DEC	29.7760	148.5000	.0000	.0000
ANN	197.6497	1070.0880	.0000	.0000

Building Boundary Energy per Square
Foot of Total Building area = 102559.5 BTU

PROJECT--FT CARSON UPDATE EEAP

BUILDING--S-6220
CASE--BASELINE
DATE--6/28/93
PREPARED BY--AJN

ZONE # 1
CASE #0

******************** BIN SOLAR ENERGY REPORT ********************
******************** DIRECT GAIN THROUGH ********************
******************** WINDOWS AND SKYLIGHTS ********************

BIN F	HOURS 7-16	SOLAR DIRECT GAIN 7 - 16 MBTU
-25 to -20	0	.0000
-20 to -15	0	.0000
-15 to -10	0	.0000
-10 to -5	0	.0000
-5 to 0	0	.0000
0 to 5	15	1.0434
5 to 10	17	1.1749
10 to 15	37	2.5407
15 to 20	55	3.7523
20 to 25	97	6.5745
25 to 30	112	7.5413
30 to 35	94	6.2875
35 to 40	144	9.5678
40 to 45	135	8.9097
45 to 50	181	11.8651
50 to 55	175	11.3938
55 to 60	178	11.5099
60 to 65	192	12.3298
65 to 70	210	13.3922
70 to 75	193	12.2222
75 to 80	192	12.0734
80 to 85	163	10.1772
85 to 90	135	8.3689
90 to 95	15	.9232
95 to 100	0	.0000
100 to 105	0	.0000
ANN	2340	151.6478

PROJECT--FT CARSON UPDATE EEAP

BUILDING--S-6220
CASE--BASELINE
DATE--6/28/93
PREPARED BY--AJN

ZONE # 1
CASE #0

****************** MONTHLY INTERNAL GAINS REPORT: ******************
****************** LOADS AND RAW SOURCE ENERGY ******************
****************** CONSUMPTION ******************

MONTH	DHW NAT GAS MBTU	LIGHTS ELEC MBTU	MISC ELEC MBTU	PEOPLE MBTU
01 J	.8676	.5890	.5133	1.8314
02 F	.8261	.5521	.4889	1.7442
03 M	.9499	.6280	.5622	2.0058
04 A	.8675	.5832	.5133	1.8314
05 M	.9087	.6085	.5378	1.9186
06 J	.9086	.6027	.5378	1.9186
07 J	.8676	.5890	.5133	1.8314
08 A	.9499	.6280	.5622	2.0058
09 S	.9086	.6027	.5378	1.9186
10 O	.8676	.5890	.5133	1.8314
11 N	.9086	.6027	.5378	1.9186
12 D	.9087	.6085	.5378	1.9186
TOT	10.7396	7.1836	6.3554	22.6746
RAW SOURCE	15.5962	24.4155	21.6007	22.6746

PROJECT--FT CARSON UPDATE EEAP

BUILDING--S-6220
CASE--BASELINE
DATE--6/28/93
PREPARED BY--AJN

ALL ZONES
CASE #0

******************** MONTHLY HEATING AND COOLING ********************
******************** RAW SOURCE ENERGY ********************
******************** CONSUMPTION REPORT ********************

MONTH	TOTAL HEATING NAT GAS MBTU	TOTAL COOLING MBTU
01 J	317.5708	.0000
02 F	285.8792	.0000
03 M	252.2219	.0000
04 A	161.3673	.0000
05 M	105.0677	.0000
06 J	.0000	.0000
07 J	.0000	.0000
08 A	.0000	.0000
09 S	69.1119	.0000
10 O	137.5409	.0000
11 N	254.7613	.0000
12 D	259.1212	.0000
ANN	1842.6420	.0000

BTU/SF/YR HEATING: 149069.0 COOLING: .0

Raw Source Energy per Square
Foot of Total Building Area = 149069.0 BTU

BCEP INPUT FORM

EMC ENGINEERS, INC. DENVER, COLORADO

CASE TYPE NEW (1) EXISTING (2) — EXISTING INPUT FILE (XXXXXX.IN) 6220.I19 — BIN CHART FOR THIS RUN (XBINXX.XX)

PROJECT DESCRIPTION (20 CHAR) — CASE DESCRIPTION (20 CHAR) RADIATOR CONTROLS — CASE or ECM # — DATE (mm/dd/yy) 4/8/93

PREPARED BY: (6C) — BUILDING NAME: (6C) — TOTAL FLOOR AREA (R) — # OF ZONES (I) — ZONE NUMBER (I) — FAN SYSTEM Y N

HEATING — MONTH ON (00-12) (I) — MONTH OFF (01-12) (I) — DD CORR. FACTOR (R) — FUEL TYPE (I) — EQPT. CAPACITY (R) — # PART LOAD PTS 2 MIN 11 MAX

PART LOAD POINTS (R) 1 2 3 4 5 6 7 8 9 10 11 — EFFICIENCY POINTS (R) 1 2 3 4 5 6 7 8 9 10 11

COOLING — MONTH ON (00-12) (I) — MONTH OFF (01-12) (I) — FUEL TYPE (I) — EQPT. CAPACITY (R) — # PART LOAD PTS. 2 MIN 11 MAX

PART LOAD POINTS 1 2 3 4 5 6 7 8 9 10 11 — EFFICIENCY POINTS 1 2 3 4 5 6 7 8 9 10 11

BIN Nº HEATING BEGINS (I) — BIN Nº COOLING BEGINS (I) — HEAT NON-WORK HOURS ? Y N — COOL NON-WORK HOURS? Y N

CONDUCTION — RUN THIS ZONE ? Y N — SOLAR RAD DISK FILE:

	WALLS NORTH	EAST	SOUTH	WEST	ROOF
AREA (R)					
U-VALUE (R)					
COLOR ADJUSTMENT FACTOR (R)					
CLTD (I)					
EXTERNAL SHADE FACTOR (R)					

ATTIC VENTILATION ? Y N — PERCENT POSSIBLE SUMMER SUNSHINE (R) — PERCENT POSSIBLE WINTER SUNSHINE (R)

GLASS (VERTICAL)	N	NE	E	SE	S	SW	W	NW	SKYLIGHT or ROOF GLASS
AREA (R)									
U-FACTOR (R)									
SHADING COEFFICIENT (R)									
COOLING LOAD FACTOR (R)									
MAX SHGF, SUMMER (I)									
MAX SHGF, WINTER (I)									
EXTERNAL SHADE FACTOR (R)									

FLOOR TYPE 0: NONE 1: PERIM. 2: CRAWL — (2) FLOOR AREA (R) — (2) FLOOR U-VALUE (R) — CRAWL SPACE TEMPERATURE S W (R) — EXPOSED PERIMETER LENGTH (R)

TEMP RANGE (I) — DESIGN DAY TEMPERATURE (R) S W — SPACE HEATING TEMPERATURE (R) D 70.0 N 70.0 — SPACE COOLING TEMPERATURE (R) D N

CONVECTION Y N — ELEVATION — AIR FLOW RATES-OCCUP/UNOCUP ACFM(R) ACFM(R) — HEATING AIR TEMP (R) D 70.0 N 70.0 — COOLING AIR TEMP (R) D N

INTERNAL GAINS — RUN THIS ZONE ? Y N — Nº of TYPES ? (I) — INTERNAL GAINS TYPES

		DHW (1)	LIGHTS (2)	APPLIANCES (3)	MISC. (4)	PEOPLE (5)
DAY:	FUEL TYPE (I)					X
	BTUH / UNIT (R)					
	NUMBER OF UNITS (I)					
	SPACE LOAD FACTOR (R)					
	SCHEDULE CORRECTION FACTOR (R)					
NIGHT:	BTUH / UNIT (R)					
	NUMBER OF UNITS (I)					
	SPACE LOAD FACTOR (R)					
	SCHEDULE CORRECTION FACTOR (R)					
	EFFICIENCY (R)					X

INPUT FILE (XXXXXX.IN) 6220.I19 — OUTPUT FILE (XXXXXX.RPT) 6220.R19

PROJECT--FT CARSON UPDATE EEAP

BUILDING--S-6220 ZONE # 1
CASE--ECO #19 - RADIATOR CONTROLS CASE #1
DATE--4/8/93
PREPARED BY--AJN

******************** BIN SOLAR ENERGY REPORT ********************
******************** DIRECT GAIN THROUGH ********************
******************** WINDOWS AND SKYLIGHTS ********************

BIN F	HOURS 7-16	SOLAR DIRECT GAIN 7 - 16 MBTU
-25 to -20	0	.0000
-20 to -15	0	.0000
-15 to -10	0	.0000
-10 to -5	0	.0000
-5 to 0	0	.0000
0 to 5	15	1.0434
5 to 10	17	1.1749
10 to 15	37	2.5407
15 to 20	55	3.7523
20 to 25	97	6.5745
25 to 30	112	7.5413
30 to 35	94	6.2875
35 to 40	144	9.5678
40 to 45	135	8.9097
45 to 50	181	11.8651
50 to 55	175	11.3938
55 to 60	178	11.5099
60 to 65	192	12.3298
65 to 70	210	13.3922
70 to 75	193	12.2222
75 to 80	192	12.0734
80 to 85	163	10.1772
85 to 90	135	8.3689
90 to 95	15	.9232
95 to 100	0	.0000
100 to 105	0	.0000
ANN	2340	151.6478

PROJECT--FT CARSON UPDATE EEAP

BUILDING--S-6220 ZONE # 1
CASE--ECO #19 - RADIATOR CONTROLS CASE #1
DATE--4/8/93
PREPARED BY--AJN

******************* MONTHLY INTERNAL GAINS REPORT: *******************
******************* LOADS AND RAW SOURCE ENERGY *******************
******************* CONSUMPTION *******************

MONTH	DHW NAT GAS MBTU	LIGHTS ELEC MBTU	MISC ELEC MBTU	PEOPLE MBTU
01 J	.8676	.5890	.5133	1.8314
02 F	.8261	.5521	.4889	1.7442
03 M	.9499	.6280	.5622	2.0058
04 A	.8675	.5832	.5133	1.8314
05 M	.9087	.6085	.5378	1.9186
06 J	.9086	.6027	.5378	1.9186
07 J	.8676	.5890	.5133	1.8314
08 A	.9499	.6280	.5622	2.0058
09 S	.9086	.6027	.5378	1.9186
10 O	.8676	.5890	.5133	1.8314
11 N	.9086	.6027	.5378	1.9186
12 D	.9087	.6085	.5378	1.9186
TOT	10.7396	7.1836	6.3554	22.6746
RAW SOURCE	15.5962	24.4155	21.6007	22.6746

PROJECT--FT CARSON UPDATE EEAP

BUILDING--S-6220 ALL ZONES
CASE--ECO #19 - RADIATOR CONTROLS CASE #1
DATE--4/8/93
PREPARED BY--AJN

******************** MONTHLY HEATING AND COOLING ********************
******************** RAW SOURCE ENERGY ********************
******************** CONSUMPTION REPORT ********************

MONTH	TOTAL HEATING NAT GAS MBTU	TOTAL COOLING MBTU
01 J	259.5408	.0000
02 F	233.4480	.0000
03 M	197.5420	.0000
04 A	117.6497	.0000
05 M	70.4382	.0000
06 J	.0000	.0000
07 J	.0000	.0000
08 A	.0000	.0000
09 S	45.6317	.0000
10 O	99.3530	.0000
11 N	201.4808	.0000
12 D	205.3037	.0000
ANN	1430.3880	.0000

BTU/SF/YR HEATING: 115717.8 COOLING: .0

Raw Source Energy per Square
Foot of Total Building Area = 115717.8 BTU

PROJECT--FT CARSON UPDATE EEAP

BUILDING--S-6230
CASE--BASELINE
DATE--11/16/92
PREPARED BY--AJN

ZONE # 1
CASE #0

******************* BIN HEATING AND COOLING *******************
******************* LOADS REPORT *******************
******************* BUILDING BOUNDARY *******************

BIN F	HOURS 7-16	HOURS 17- 6	MECH HEATING LOADS 7 - 16 MBTU	MECH HEATING LOADS 17 - 6 MBTU	MECH COOLING LOADS 7 - 16 MBTU	MECH COOLING LOADS 17 - 6 MBTU
-25 to -20	0	0	.0000	.0000	.0000	.0000
-20 to -15	0	0	.0000	.0000	.0000	.0000
-15 to -10	0	0	.0000	.0000	.0000	.0000
-10 to -5	0	2	.0000	1.1249	.0000	.0000
-5 to 0	0	8	.0000	4.2579	.0000	.0000
0 to 5	15	94	5.8615	47.1340	.0000	.0000
5 to 10	17	121	6.1110	57.1960	.0000	.0000
10 to 15	37	168	12.1610	74.5970	.0000	.0000
15 to 20	55	303	16.3660	125.4700	.0000	.0000
20 to 25	97	376	25.8810	144.4300	.0000	.0000
25 to 30	112	486	26.1890	171.7400	.0000	.0000
30 to 35	94	353	19.0560	114.1000	.0000	.0000
35 to 40	144	407	24.6410	118.4200	.0000	.0000
40 to 45	135	493	18.5940	122.0200	.0000	.0000
45 to 50	181	594	18.3450	122.5100	.0000	.0000
50 to 55	175	556	11.5460	88.2280	.0000	.0000
55 to 60	178	563	6.5547	57.6640	.0000	.0000
60 to 65	192	621	.0000	.0000	.0000	.0000
65 to 70	210	521	.0000	.0000	.0000	.0000
70 to 75	193	327	.0000	.0000	.0000	.0000
75 to 80	192	220	.0000	.0000	.0000	.0000
80 to 85	163	114	.0000	.0000	.0000	.0000
85 to 90	135	74	.0000	.0000	.0000	.0000
90 to 95	15	19	.0000	.0000	.0000	.0000
95 to 100	0	0	.0000	.0000	.0000	.0000
100 to 105	0	0	.0000	.0000	.0000	.0000
ANN	2340	6420	191.3070	1248.8850	.0000	.0000

PROJECT--FT CARSON UPDATE EEAP

BUILDING--S-6230
CASE--BASELINE
DATE--11/16/92
PREPARED BY--AJN

ZONE # 1
CASE #0

******************** MONTHLY HEATING AND COOLING ********************
******************** LOADS REPORT ********************
******************** BUILDING BOUNDARY ********************

MONTH	MECH HEATING LOADS 7 - 16 MBTU	MECH HEATING LOADS 17 - 6 MBTU	MECH COOLING LOADS 7 - 16 MBTU	MECH COOLING LOADS 17 - 6 MBTU
01 JAN	39.9820	205.2500	.0000	.0000
02 FEB	35.8480	182.9200	.0000	.0000
03 MAR	25.9640	167.8600	.0000	.0000
04 APR	13.8870	112.1900	.0000	.0000
05 MAY	5.2932	78.5330	.0000	.0000
06 JUN	.0000	.0000	.0000	.0000
07 JUL	.0000	.0000	.0000	.0000
08 AUG	.0000	.0000	.0000	.0000
09 SEP	2.1268	55.7520	.0000	.0000
10 OCT	5.3225	107.4700	.0000	.0000
11 NOV	33.3520	165.5700	.0000	.0000
12 DEC	29.5310	173.3400	.0000	.0000
ANN	191.3070	1248.8850	.0000	.0000

Building Boundary Energy per Square
Foot of Total Building area = 67141.8 BTU

BCEP INPUT FORM

EMC ENGINEERS, INC. DENVER, COLORADO

CASE TYPE NEW (1) EXISTING (2)	EXISTING INPUT FILE (XXXXXX.IN)	BIN CHART FOR THIS RUN (XBINXX.XX)
2	6230.IN	FCBIN.2

PROJECT DESCRIPTION (20 CHAR)	CASE DESCRIPTION (20 CHAR)	CASE or ECM #	DATE (mm/dd/yy)
FT CARSON	BASELINE	Ø	6/28/93

PREPARED BY: (6C)	BUILDING NAME: (6C)	TOTAL FLOOR AREA (R)	# OF ZONES (I)	ZONE NUMBER (I)	FAN SYSTEM Y N
AJN	S-6230	21450.0	1	1	N

HEATING	MONTH ON (00-12) (I)	MONTH OFF (01-12) (I)	DD CORR. FACTOR (R)	FUEL TYPE (I)	EQPT. CAPACITY (R)	# PART LOAD PTS 2 MIN 11 MAX
	9	5	1.0	3	1416000	2

PART LOAD POINTS (R)	1	2	3	4	5	6	7	8	9	10	11
	0.1	1.0									
EFFICIENCY POINTS (R)	0.69	0.69									

COOLING	MONTH ON (00-12) (I)	MONTH OFF (01-12) (I)	FUEL TYPE (I)	EQPT. CAPACITY (R)	# PART LOAD PTS. 2 MIN 11 MAX
	Ø	Ø	Ø	Ø	Ø

PART LOAD POINTS	1	2	3	4	5	6	7	8	9	10	11
EFFICIENCY POINTS											

BIN Nº HEATING BEGINS (I)	BIN Nº COOLING BEGINS (I)	HEAT NON-WORK HOURS ? Y N	COOL NON-WORK HOURS ? Y N
17	Ø	Y	N

CONDUCTION	RUN THIS ZONE ? Y N	SOLAR RAD DISK FILE:
	Y	SOLAR.N

WALLS	NORTH	EAST	SOUTH	WEST	ROOF
AREA (R)	767.0	4468.0	767.0	4492.0	9,132.0
U-VALUE (R)	0.24	0.24	0.24	0.24	0.069
COLOR ADJUSTMENT FACTOR (R)	0.65	0.65	0.65	0.65	0.8
CLTD (I)	Ø	Ø	Ø	Ø	Ø
EXTERNAL SHADE FACTOR (R)	1.0	1.0	1.0	1.0	1.0

ATTIC VENTILATION ? Y N	PERCENT POSSIBLE SUMMER SUNSHINE (R)	PERCENT POSSIBLE WINTER SUNSHINE (R)
N	67.0	66.0

GLASS (VERTICAL)	N	NE	E	SE	S	SW	W	NW	SKYLIGHT or ROOF GLASS
AREA (R)	332.0		824.0		332.0		800.0		
U-FACTOR (R)	0.568		0.568		0.568		0.568		
SHADING COEFFICIENT (R)	1.0		1.0		1.0		1.0		
COOLING LOAD FACTOR (R)	11.53		5.47		6.43		5.47		
MAX SHGF, SUMMER (I)	38		216		109		216		
MAX SHGF, WINTER (I)	20		154		254		154		
EXTERNAL SHADE FACTOR (R)	1.0		1.0		1.0		1.0		

FLOOR TYPE 0: NONE 1: PERIM. 2: CRAWL	(2) FLOOR AREA (R)	(2) FLOOR U-VALUE (R)	CRAWL SPACE TEMPERATURE (R)	EXPOSED PERIMETER LENGTH (R)
2	9132.0	0.4098	S 50.0 W 50.0	—

TEMP RANGE (I)	DESIGN DAY TEMPERATURE (R)	SPACE HEATING TEMPERATURE (R)	SPACE COOLING TEMPERATURE (R)
30	S 91.0 W -3.0	D 78.0 N 78.0	D — N —

CONVECTION Y N	ELEVATION	AIR FLOW RATES-OCCUP/UNOCUP	HEATING AIR TEMP (R)	COOLING AIR TEMP (R)
Y		1708.0 ACFM(R) / 1708.0 ACFM(R)	D 78.0 N 78.0	D — N —

INTERNAL GAINS — RUN THIS ZONE ? Y N — Nº of TYPES ? (I)

INTERNAL GAINS TYPES		DHW (1)	LIGHTS (2)	APPLIANCES (3)	MISC. (4)	PEOPLE (5)
	FUEL TYPE (I)	3	1		1	
DAY:	BTUH / UNIT (R)	18067.0	3020.0		300.0	255.0
	NUMBER OF UNITS (I)	1	1		1	0
	SPACE LOAD FACTOR (R)	0.001	1.0		1.0	1.0
	SCHEDULE CORRECTION FACTOR (R)	1.0	0.0		0.0	1.0
NIGHT:	BTUH / UNIT (R)	18067.0	3020.0		300.0	255.0
	NUMBER OF UNITS (I)	1	1		1	60
	SPACE LOAD FACTOR (R)	0.001	1.0		1.0	1.0
	SCHEDULE CORRECTION FACTOR (R)	0.1	0.44		0.44	1.0
	EFFICIENCY (R)	68.86	100.0		100.0	

INPUT FILE (XXXXXX.IN) 6230.IN OUTPUT FILE (XXXXXX.RPT) 6230.RPT

PROJECT--FT CARSON UPDATE EEAP

BUILDING--S-6230
CASE--BASELINE
DATE--6/28/93
PREPARED BY--AJN

ZONE # 1
CASE #0

******************** BIN HEATING AND COOLING ********************
******************** LOADS REPORT ********************
******************** BUILDING BOUNDARY ********************

BIN F	HOURS 7-16	HOURS 17- 6	MECH HEATING LOADS 7 - 16 MBTU	MECH HEATING LOADS 17 - 6 MBTU	MECH COOLING LOADS 7 - 16 MBTU	MECH COOLING LOADS 17 - 6 MBTU
-25 to -20	0	0	.0000	.0000	.0000	.0000
-20 to -15	0	0	.0000	.0000	.0000	.0000
-15 to -10	0	0	.0000	.0000	.0000	.0000
-10 to -5	0	2	.0000	1.1637	.0000	.0000
-5 to 0	0	8	.0000	4.4128	.0000	.0000
0 to 5	15	94	6.1521	48.9540	.0000	.0000
5 to 10	17	121	6.4403	59.5400	.0000	.0000
10 to 15	37	168	12.8780	77.8500	.0000	.0000
15 to 20	55	303	17.4320	131.3400	.0000	.0000
20 to 25	97	376	27.7600	151.7100	.0000	.0000
25 to 30	112	486	28.3570	181.1500	.0000	.0000
30 to 35	94	353	20.8770	120.9300	.0000	.0000
35 to 40	144	407	27.4310	126.2400	.0000	.0000
40 to 45	135	493	21.2100	131.0700	.0000	.0000
45 to 50	181	594	21.6960	132.7700	.0000	.0000
50 to 55	175	556	14.6070	96.7510	.0000	.0000
55 to 60	178	563	9.6926	64.2090	.0000	.0000
60 to 65	192	621	.0000	.0000	.0000	.0000
65 to 70	210	521	.0000	.0000	.0000	.0000
70 to 75	193	327	.0000	.0000	.0000	.0000
75 to 80	192	220	.0000	.0000	.0000	.0000
80 to 85	163	114	.0000	.0000	.0000	.0000
85 to 90	135	74	.0000	.0000	.0000	.0000
90 to 95	15	19	.0000	.0000	.0000	.0000
95 to 100	0	0	.0000	.0000	.0000	.0000
100 to 105	0	0	.0000	.0000	.0000	.0000
ANN	2340	6420	214.5312	1328.1040	.0000	.0000

PROJECT--FT CARSON UPDATE EEAP

BUILDING--S-6230
CASE--BASELINE
DATE--6/28/93
PREPARED BY--AJN

ZONE # 1
CASE #0

******************** MONTHLY HEATING AND COOLING ********************
******************** LOADS REPORT ********************
******************** BUILDING BOUNDARY ********************

MONTH	MECH HEATING LOADS 7 - 16 MBTU	MECH HEATING LOADS 17 - 6 MBTU	MECH COOLING LOADS 7 - 16 MBTU	MECH COOLING LOADS 17 - 6 MBTU
01 JAN	43.6420	216.0000	.0000	.0000
02 FEB	39.3340	192.4500	.0000	.0000
03 MAR	29.4510	177.9500	.0000	.0000
04 APR	16.2510	120.7000	.0000	.0000
05 MAY	6.8428	85.6030	.0000	.0000
06 JUN	.0000	.0000	.0000	.0000
07 JUL	.0000	.0000	.0000	.0000
08 AUG	.0000	.0000	.0000	.0000
09 SEP	2.7853	60.9430	.0000	.0000
10 OCT	6.5042	115.8000	.0000	.0000
11 NOV	36.8000	175.3500	.0000	.0000
12 DEC	32.9210	183.3200	.0000	.0000
ANN	214.5312	1328.1040	.0000	.0000

Building Boundary Energy per Square
Foot of Total Building area = 71917.7 BTU

PROJECT--FT CARSON UPDATE EEAP

BUILDING--S-6230
CASE--BASELINE
DATE--6/28/93
PREPARED BY--AJN

ZONE # 1
CASE #0

******************** BIN SOLAR ENERGY REPORT ********************
******************** DIRECT GAIN THROUGH ********************
******************** WINDOWS AND SKYLIGHTS ********************

BIN F	HOURS 7-16	SOLAR DIRECT GAIN 7 - 16 MBTU
-25 to -20	0	.0000
-20 to -15	0	.0000
-15 to -10	0	.0000
-10 to -5	0	.0000
-5 to 0	0	.0000
0 to 5	15	1.9163
5 to 10	17	2.2020
10 to 15	37	4.8584
15 to 20	55	7.3197
20 to 25	97	13.0819
25 to 30	112	15.3040
30 to 35	94	13.0116
35 to 40	144	20.1888
40 to 45	135	19.1671
45 to 50	181	26.0201
50 to 55	175	25.4688
55 to 60	178	26.2220
60 to 65	192	28.6258
65 to 70	210	31.6830
70 to 75	193	29.4614
75 to 80	192	29.6503
80 to 85	163	25.4618
85 to 90	135	21.3281
90 to 95	15	2.3965
95 to 100	0	.0000
100 to 105	0	.0000
ANN	2340	343.3675

PROJECT--FT CARSON UPDATE EEAP

BUILDING--S-6230
CASE--BASELINE
DATE--6/28/93
PREPARED BY--AJN

ZONE # 1
CASE #0

****************** MONTHLY INTERNAL GAINS REPORT: ******************
****************** LOADS AND RAW SOURCE ENERGY ******************
****************** CONSUMPTION ******************

MONTH	DHW NAT GAS MBTU	LIGHTS ELEC MBTU	MISC ELEC MBTU	PEOPLE MBTU
01 J	4.4174	.7375	.0733	8.4915
02 F	4.1410	.6538	.0649	7.5276
03 M	4.7101	.7136	.0709	8.2161
04 A	4.3740	.7056	.0701	8.1243
05 M	4.5637	.7255	.0721	8.3538
06 J	4.5204	.6936	.0689	7.9866
07 J	4.4174	.7375	.0733	8.4915
08 A	4.7101	.7136	.0709	8.2161
09 S	4.5204	.6936	.0689	7.9866
10 O	4.4174	.7375	.0733	8.4915
11 N	4.5204	.6936	.0689	7.9866
12 D	4.5637	.7255	.0721	8.3538
TOT	53.8758	8.5309	.8474	98.2260
RAW SOURCE	78.2396	28.9945	2.8803	98.2260

PROJECT--FT CARSON UPDATE EEAP

BUILDING--S-6230
CASE--BASELINE
DATE--6/28/93
PREPARED BY--AJN

ALL ZONES
CASE #0

******************** MONTHLY HEATING AND COOLING ********************
******************** RAW SOURCE ENERGY ********************
******************** CONSUMPTION REPORT ********************

MONTH	TOTAL HEATING NAT GAS MBTU	TOTAL COOLING MBTU
01 J	377.3842	.0000
02 F	336.9019	.0000
03 M	301.4541	.0000
04 A	199.0493	.0000
05 M	134.3686	.0000
06 J	.0000	.0000
07 J	.0000	.0000
08 A	.0000	.0000
09 S	92.6276	.0000
10 O	177.7608	.0000
11 N	308.3561	.0000
12 D	314.2997	.0000
ANN	2242.2020	.0000

BTU/SF/YR HEATING: 104531.6 COOLING: .0

Raw Source Energy per Square
Foot of Total Building Area = 104531.6 BTU

BCEP INPUT FORM

EMC ENGINEERS, INC. DENVER, COLORADO

CASE TYPE NEW (1) EXISTING (2)	EXISTING INPUT FILE (XXXXXX.IN)		BIN CHART FOR THIS RUN (XBINXX.XX)
(2)	6230.I19		

PROJECT DESCRIPTION (20 CHAR)	CASE DESCRIPTION (20 CHAR)	CASE or ECM #	DATE (mm/dd/yy)
	RADIATOR CONTROLS		4/8/93

PREPARED BY: (6C)	BUILDING NAME: (6C)	TOTAL FLOOR AREA (R)	# OF ZONES (1)	ZONE NUMBER (1)	FAN SYSTEM Y N

HEATING	MONTH ON (00-12) (1)	MONTH OFF (01-12) (1)	DD CORR. FACTOR (R)	FUEL TYPE (1)	EQPT. CAPACITY (R)	# PART LOAD PTS 2 MIN 11 MAX

PART LOAD POINTS (R)	1	2	3	4	5	6	7	8	9	10	11
EFFICIENCY POINTS (R)	1	2	3	4	5	6	7	8	9	10	11

COOLING	MONTH ON (00-12) (1)	MONTH OFF (01-12) (1)		FUEL TYPE (1)	EQPT. CAPACITY (R)	# PART LOAD PTS. 2 MIN 11 MAX

PART LOAD POINTS	1	2	3	4	5	6	7	8	9	10	11
EFFICIENCY POINTS	1	2	3	4	5	6	7	8	9	10	11

BIN Nº HEATING BEGINS (1)	BIN Nº COOLING BEGINS (1)	HEAT NON-WORK HOURS ? Y N	COOL NON-WORK HOURS ? Y N

CONDUCTION	RUN THIS ZONE ? Y N		SOLAR RAD DISK FILE:

	WALLS NORTH	EAST	SOUTH	WEST	ROOF
AREA (R)					
U-VALUE (R)					
COLOR ADJUSTMENT FACTOR (R)					
CLTD (1)					
EXTERNAL SHADE FACTOR (R)					

ATTIC VENTILATION ? Y N	PERCENT POSSIBLE SUMMER SUNSHINE (R)	PERCENT POSSIBLE WINTER SUNSHINE (R)

	GLASS (VERTICAL) N	NE	E	SE	S	SW	W	NW	SKYLIGHT or ROOF GLASS
AREA (R)									
U-FACTOR (R)									
SHADING COEFFICIENT (R)									
COOLING LOAD FACTOR (R)									
MAX SHGF, SUMMER (1)									
MAX SHGF, WINTER (1)									
EXTERNAL SHADE FACTOR (R)									

FLOOR TYPE 0: NONE 1: PERIM. 2: CRAWL	(2) FLOOR AREA (R)	(2) FLOOR U-VALUE (R)	CRAWL SPACE TEMPERATURE S W (R)	EXPOSED PERIMETER LENGTH (R)

TEMP RANGE (1)		DESIGN DAY TEMPERATURE (R)	SPACE HEATING TEMPERATURE (R)	SPACE COOLING TEMPERATURE (R)
		S W	D 70.0 N 70.0	D N

CONVECTION Y N	ELEVATION	AIR FLOW RATES—OCCUP / UNOCUP	HEATING AIR TEMP (R)	COOLING AIR TEMP (R)
		ACFM(R) ACFM(R)	D 70.0 N 70.0	D N

INTERNAL GAINS	RUN THIS ZONE ? Y N	Nº of TYPES ? (1)	DHW (1)	LIGHTS (2)	APPLIANCES (3)	MISC. (4)	PEOPLE (5)
DAY:	FUEL TYPE	(1)					X
	BTUH / UNIT	(R)					
	NUMBER OF UNITS	(1)					
	SPACE LOAD FACTOR	(R)					
	SCHEDULE CORRECTION FACTOR	(R)					
NIGHT:	BTUH / UNIT	(R)					
	NUMBER OF UNITS	(1)					
	SPACE LOAD FACTOR	(R)					
	SCHEDULE CORRECTION FACTOR	(R)					
	EFFICIENCY	(R)					X

INPUT FILE (XXXXXX.IN) 6230.I19 OUTPUT FILE (XXXXXX.RPT) 6230.R19

PROJECT--FT CARSON UPDATE EEAP

BUILDING--S-6230 ZONE # 1
CASE--ECO #19 - RADIATOR CONTROLS CASE #1
DATE--4/8/93
PREPARED BY--AJN

******************** BIN HEATING AND COOLING ********************
******************** LOADS REPORT ********************
******************** BUILDING BOUNDARY ********************

BIN F	HOURS 7-16	HOURS 17- 6	MECH HEATING LOADS 7 - 16 MBTU	MECH HEATING LOADS 17 - 6 MBTU	MECH COOLING LOADS 7 - 16 MBTU	MECH COOLING LOADS 17 - 6 MBTU
-25 to -20	0	0	.0000	.0000	.0000	.0000
-20 to -15	0	0	.0000	.0000	.0000	.0000
-15 to -10	0	0	.0000	.0000	.0000	.0000
-10 to -5	0	2	.0000	1.0087	.0000	.0000
-5 to 0	0	8	.0000	3.7930	.0000	.0000
0 to 5	15	94	4.9900	41.6720	.0000	.0000
5 to 10	17	121	5.1231	50.1660	.0000	.0000
10 to 15	37	168	10.0110	64.8340	.0000	.0000
15 to 20	55	303	13.1700	107.8700	.0000	.0000
20 to 25	97	376	20.2450	122.5800	.0000	.0000
25 to 30	112	486	19.6810	143.5000	.0000	.0000
30 to 35	94	353	13.5940	93.5850	.0000	.0000
35 to 40	144	407	16.2740	94.9410	.0000	.0000
40 to 45	135	493	10.7500	94.8850	.0000	.0000
45 to 50	181	594	8.2917	91.7110	.0000	.0000
50 to 55	175	556	2.3649	62.6610	.0000	.0000
55 to 60	178	563	.0000	38.0230	.0000	.0000
60 to 65	192	621	.0000	.0000	.0000	.0000
65 to 70	210	521	.0000	.0000	.0000	.0000
70 to 75	193	327	.0000	.0000	.0000	.0000
75 to 80	192	220	.0000	.0000	.0000	.0000
80 to 85	163	114	.0000	.0000	.0000	.0000
85 to 90	135	74	.0000	.0000	.0000	.0000
90 to 95	15	19	.0000	.0000	.0000	.0000
95 to 100	0	0	.0000	.0000	.0000	.0000
100 to 105	0	0	.0000	.0000	.0000	.0000
ANN	2340	6420	124.4945	1011.2250	.0000	.0000

PROJECT--FT CARSON UPDATE EEAP

BUILDING--S-6230 ZONE # 1
CASE--ECO #19 - RADIATOR CONTROLS CASE #1
DATE--4/8/93
PREPARED BY--AJN

******************** MONTHLY HEATING AND COOLING ********************
******************** LOADS REPORT ********************
******************** BUILDING BOUNDARY ********************

MONTH	MECH HEATING LOADS 7 - 16 MBTU	MECH HEATING LOADS 17 - 6 MBTU	MECH COOLING LOADS 7 - 16 MBTU	MECH COOLING LOADS 17 - 6 MBTU
01 JAN	28.9990	173.0000	.0000	.0000
02 FEB	25.5480	154.3300	.0000	.0000
03 MAR	16.1150	137.5800	.0000	.0000
04 APR	7.2109	86.6830	.0000	.0000
05 MAY	1.4547	57.3240	.0000	.0000
06 JUN	.0000	.0000	.0000	.0000
07 JUL	.0000	.0000	.0000	.0000
08 AUG	.0000	.0000	.0000	.0000
09 SEP	.4890	40.1790	.0000	.0000
10 OCT	2.0481	82.4800	.0000	.0000
11 NOV	23.1350	136.2200	.0000	.0000
12 DEC	19.4950	143.4200	.0000	.0000
ANN	124.4945	1011.2250	.0000	.0000

Building Boundary Energy per Square
Foot of Total Building area = 52947.3 BTU

PROJECT--FT CARSON UPDATE EEAP

BUILDING--S-6230 ZONE # 1
CASE--ECO #19 - RADIATOR CONTROLS CASE #1
DATE--4/8/93
PREPARED BY--AJN

******************** BIN SOLAR ENERGY REPORT ********************
******************** DIRECT GAIN THROUGH ********************
******************** WINDOWS AND SKYLIGHTS ********************

BIN F	HOURS 7-16	SOLAR DIRECT GAIN 7 - 16 MBTU
-25 to -20	0	.0000
-20 to -15	0	.0000
-15 to -10	0	.0000
-10 to -5	0	.0000
-5 to 0	0	.0000
0 to 5	15	1.9163
5 to 10	17	2.2020
10 to 15	37	4.8584
15 to 20	55	7.3197
20 to 25	97	13.0819
25 to 30	112	15.3040
30 to 35	94	13.0116
35 to 40	144	20.1888
40 to 45	135	19.1671
45 to 50	181	26.0201
50 to 55	175	25.4688
55 to 60	178	26.2220
60 to 65	192	28.6258
65 to 70	210	31.6830
70 to 75	193	29.4614
75 to 80	192	29.6503
80 to 85	163	25.4618
85 to 90	135	21.3281
90 to 95	15	2.3965
95 to 100	0	.0000
100 to 105	0	.0000
ANN	2340	343.3675

PROJECT--FT CARSON UPDATE EEAP

BUILDING--S-6230 ZONE # 1
CASE--ECO #19 - RADIATOR CONTROLS CASE #1
DATE--4/8/93
PREPARED BY--AJN

****************** MONTHLY INTERNAL GAINS REPORT: ******************
****************** LOADS AND RAW SOURCE ENERGY ******************
****************** CONSUMPTION ******************

MONTH	DHW NAT GAS MBTU	LIGHTS ELEC MBTU	MISC ELEC MBTU	PEOPLE MBTU
01 J	4.4174	.7375	.0733	8.4915
02 F	4.1410	.6538	.0649	7.5276
03 M	4.7101	.7136	.0709	8.2161
04 A	4.3740	.7056	.0701	8.1243
05 M	4.5637	.7255	.0721	8.3538
06 J	4.5204	.6936	.0689	7.9866
07 J	4.4174	.7375	.0733	8.4915
08 A	4.7101	.7136	.0709	8.2161
09 S	4.5204	.6936	.0689	7.9866
10 O	4.4174	.7375	.0733	8.4915
11 N	4.5204	.6936	.0689	7.9866
12 D	4.5637	.7255	.0721	8.3538
TOT	53.8758	8.5309	.8474	98.2260
RAW SOURCE	78.2396	28.9945	2.8803	98.2260

PROJECT--FT CARSON UPDATE EEAP

BUILDING--S-6230
CASE--ECO #19 - RADIATOR CONTROLS
DATE--4/8/93
PREPARED BY--AJN

ALL ZONES
CASE #1

******************** MONTHLY HEATING AND COOLING ********************
******************** RAW SOURCE ENERGY ********************
******************** CONSUMPTION REPORT ********************

MONTH	TOTAL HEATING NAT GAS MBTU	TOTAL COOLING MBTU
01 J	293.6041	.0000
02 F	261.4554	.0000
03 M	223.3972	.0000
04 A	136.4743	.0000
05 M	85.4338	.0000
06 J	.0000	.0000
07 J	.0000	.0000
08 A	.0000	.0000
09 S	59.1106	.0000
10 O	122.8604	.0000
11 N	231.6279	.0000
12 D	236.7909	.0000
ANN	1650.7550	.0000

BTU/SF/YR HEATING: 76958.3 COOLING: .0

Raw Source Energy per Square
Foot of Total Building Area = 76958.3 BTU

DANFOSS RA...
the simplified combination design makes ordering easier than ever.

Combination hot water/low-pressure steam Danfoss RA thermostatic radiator valves make specifying, ordering, stocking, and installation easy. You need only stock quantities of eight different valves, plus the appropriate accessories, parts, and tools shown below.

In addition, RA combination valves may be used interchangeably with a variety of dial/operator/sensor models.

The chart below gives you an overview of the entire RA line. If you have a specific question, feel free to call your Danfoss representative for assistance.

MPD Co., Denver, CO. (303) 322-0169 DAVID PETTIT (4-8-93) $54.15

Valves For use on hot water (max. 250°F) and 2-pipe LPS (max. 15 psig)			Operators Cap. tube lengths: 6′	6′ armored	3′ + 3′	3′ + 6′	6′ + 6′
Configuration	Connection FPT x MPT	Cv	013-7001	013-7101	013-7002	013-7003	013-7004
	1/2″ NPT	2.75			013-7151		
	3/4″ NPT	2.75			013-7153	$18.15	
	1″ NPT	5.15			013-7155		
	1¼″ NPT	5.15			013-7157		
	1/2″ NPT	2.75			013-7152		
	3/4″ NPT	2.75			013-7154		
	1″ NPT	5.15			013-7156		
	1¼″ NPT	5.15			013-7158		
Parts and accessories							
Configuration	Description						
	1/2″ universal valve repair kit 3/4″ universal valve repair kit				013-7172 013-7173		
	1″ universal valve repair kit 1¼″ universal valve repair kit				013-7174 013-7175		
	1/2″ steam strainer 3/4″ steam strainer 1″ steam strainer 1¼″ steam strainer				013-7242 013-7243 013-7244 013-7245		
	Gasket				013-7045		
	1″ and 1¼″ stem retainer				013-7046		
	1/2″ and 3/4″ valve repair tool				013-7047		
	Sensor guard				013-0030		
	Tamper kit (repairs dial and knob)				013-7064		
	Tamper screw for selector knob				681X2902		
	Screwdriver for above				948U2103		

TAB C-5

ECO SUMMARY

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION: FORT CARSON, COLORADO   REGION: 4   PROJECT NO:
PROJECT TITLE: FT CARSON EEAP UPDATE   FISCAL YEAR: 1992
DISCRETE PORTION NAME: ECOs 13, 14, 16, and 19
ANALYSIS DATE: 07/01/93   ECONOMIC LIFE: 20   PREPARED BY: A. NIEMEYER

1 INVESTMENT COSTS

A.	CONSTRUCTION COST	=	$332,813	
B.	SIOH COST	(5.5% of 1A) =	$18,305	
C.	DESIGN COST	(6.0% of 1A) =	$19,969	
D.	TOTAL COST	(1A + 1B + 1C) =	$371,086	
E.	SALVAGE VALUE	=	$0	
F.	SALVAGE VALUE OF EXISTING EQUIP.	=	$0	
G.	TOTAL INVESTMENT	(1D - 1E - 1F) =	--------->	$371,086

2 ENERGY SAVINGS (+) or COST (-)

DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS: OCTOBER 1992

	ENERGY SOURCE	COST $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A.	ELEC	$7.32	867.91	$6,357	14.53	$92,373	
B.	DIST			$0	17.63	$0	
C.	NAT GAS	$3.48	12813.48	$44,540	18.59	$827,992	
D.	COAL			$0	14.46	$0	
E.	SOLAR			$0		$0	
F.	DEMAND SAVINGS	$69.68 / year		$2,747	13.59	$37,338	
G.	TOTAL		13681.39	53,644.5		--------->	$957,703

3 NONENERGY SAVINGS (+) or COST (-)

A. ANNUAL RECURRING			$0	
1 DISCOUNT FACTOR	(From Table A-2) =	13.59		
2 DISCOUNTED SAVINGS or COST	(3A x 3A1) =		$0	

B. NONRECURRING

ITEM	SAVINGS or COST (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3)	DISCOUNTED SVGS or COST (4)	
a. 141 Standard Motors (1/2 to 40 HP)	$69,964	5	0.82	$57,370	
b.	$0	0	0.00	$0	
c.	$0	0	0.00	$0	
d TOTAL	$69,964			$57,370	
C. TOTAL NONENERGY DISCOUNTED SAVINGS or COST			(3A2 + 3Bd4) =		$57,370

4 SIMPLE PAYBACK (SPB) - (YRS)	1G/(2G3 + 3A + (3Bd1/20)) =	6.5
5 TOTAL NET DISCOUNTED SAVINGS	(2G5 + 3C) =	$1,015,074
6 SAVINGS-TO-INVESTMENT RATIO (SIR)	(5/1G) =	2.74
7 ADJUSTED INTERNAL RATE OF RETURN (AIRR) - (%)	[(1+.04) x SIR to 1/20 power - 1] x 100 =	9.37

APPENDIX D

BACKUP DATA,
HEATING AND COOLING EQUIPMENT DISCREPANCIES
AND
BUILDING SURVEY FORMS

TAB 1

HEATING AND COOLING EQUIPMENT DISCREPANCIES

CONSTRUCTION COST ESTIMATE	DATE PREPARED 7-Apr-93	SHEET OF

Project: UPDATE EXISTING EEAP	BASIS FOR ESTIMATE
Location: FORT CARSON, COLORADO	X Code A (No design completed) __ Code B (Preliminary design) __ Code C (Final design) __ Other (Specify)________
Architect-Engineer: E M C ENGINEERS, INC., 2750 S. WADSWORTH BLVD., DENVER, CO 80227	

Drawing No.	Estimator	Checked by
	John Mekis	T. FORSTER

SUMMARY	Quantity		Labor		Material		Total Cost
	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	
GROUP 1: BARRACKS - "A"				1,720.30		7,824.43	9,544.74
GROUP 2: BARRACKS - "B"				10,512.88		88,111.58	98,624.46
GROUP 3: DISPENSARY				955.72		6,385.11	7,340.82
GROUP 4: 3 CO. HQ.				11,506.95		60,834.15	72,341.10
GROUP 5: DENTAL CLINIC, BLDG P 1227				477.86		3,192.55	3,670.41
GROUP 6: INDOOR POOL, BLDG 1446				707.23		7,585.46	8,292.69
GROUP 7: COMMUNITY CENTER				764.57		4,686.52	5,451.09
GROUP 8: MAIN LIBRARY, BLDG 1528				0.00		0.00	0.00
GROUP 9: DENTAL CLINIC, BLDG 1855				1,013.06		6,401.08	7,414.14
GROUP 10: COOLING PLANT, BLDG 1864				1,032.18		10,869.41	11,901.58
GROUP 11: DAY ROOM & ADMIN.				1,720.27		10,622.97	12,343.24
GROUP 12: CO ADMIN & SUPPLY				3,440.54		15,337.43	18,777.97
GROUP 13: BN ADMIN & CLRM				2,484.85		13,814.17	16,299.02
GROUP 14: GYM				2,370.18		15,547.48	17,917.66
GROUP 15: UNIT CAHPEL				1,108.63		8,682.21	9,790.84
GROUP 16: CONS. FLD MNT SHOP				1,318.89		9,810.84	11,129.73
GROUP 17: D/S ORG. MAINT				592.55		3,274.08	3,866.63
GROUP 18: DS MAINT SHOP				745.46		4,784.08	5,529.54
TOTALS:				42,472.12		277,763.54	320,235.66

ENG FORM 150
1 AUG 59

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CONSTRUCTION COST ESTIMATE	DATE PREPARED 7-Apr-93	SHEET OF
Project: UPDATE EXISTING EEAP	BASIS FOR ESTIMATE	
Location: FORT CARSON, COLORADO	X Code A (No design completed) __ Code B (Preliminary design) __ Code C (Final design) __ Other (Specify)____	
Architect-Engineer: E M C ENGINEERS, INC., 2750 S. WADSWORTH BLVD., DENVER, CO 80227		
Drawing No.	Estimator: John Mekis	Checked by: T. FORSTER

GROUP 1: BARRACKS - "A"	Quantity		Labor		Material		
	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total Cost
Valve 2-Way, 1/2", with electric/electronic actuator	1	EA	45.62	45.62	197.00	197.00	242.62
Valve 2-Way, 1/2", with electric/electronic actuator	1	EA	45.62	45.62	197.00	197.00	242.62
New Pneumatic Damper Actuator	1	EA	34.22	34.22	186.00	186.00	220.22
Valve 3-Way, 2", with electric/electronic actuator	1	EA	79.84	79.84	435.00	435.00	514.84
SUBTOTAL @ BUILDING				205.30		1,015.00	1,220.30
BUILDINGS:				205.30		1,015.00	1,220.30
P 1950				205.30		1,015.00	1,220.30
P 2070				205.30		1,015.00	1,220.30
P 2153				205.30		1,015.00	1,220.30
P 2250				205.30		1,015.00	1,220.30
SUBTOTAL				1,026.50		5,075.00	6,101.50
WORKERS COMP INSURANCE	8.7%			89.31			
SUBTOTAL				1,115.81		5,075.00	6,190.81
OVERHEAD & BOND	16.8%			187.46		852.60	1,040.06
SUBTOTAL				1,303.26		5,927.60	7,230.86
PROFIT	10.0%			130.33		592.76	723.09
SUBTOTAL				1,433.59		6,520.36	7,953.95
CONTINGENCY	20.0%			286.72		1,304.07	1,590.79
TOTAL ESTIMATED COST				1,720.30		7,824.43	9,544.74

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CONSTRUCTION COST ESTIMATE

DATE PREPARED 7-Apr-93

SHEET OF

Project
UPDATE EXISTING EEAP

Location
FORT CARSON, COLORADO

Architect-Engineer
E M C ENGINEERS, INC., 2750 S. WADSWORTH BLVD., DENVER, CO 80227

BASIS FOR ESTIMATE

- X Code A (No design completed)
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- __ Code C (Final design)
- __ Other (Specify)________

Drawing No.

Estimator John Mekis

Checked by T. FORSTER

GROUP 2: BARRACKS - "B"	Quantity		Labor		Material		Total Cost
	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	
Valve 2-Way, 1", with electric/electronic actuator	1	EA	45.62	45.62	252.00	252.00	297.62
Valve 2-Way, 1-1/2", with electric/electronic actuator	2	EA	57.03	114.05	342.00	684.00	798.05
Valve 3-Way, 2-1/2", with electric/electronic actuator	1	EA	91.24	91.24	1,350.00	1,350.00	1,441.24
SUBTOTAL @ BUILDING				250.92		2,286.00	2,536.92
BUILDINGS:							
P 1951,1952,1953,1954	4		250.92	1,003.68	2,286.00	9,144.00	10,147.68
P 2050,2051,2052,2054	4		250.92	1,003.68	2,286.00	9,144.00	10,147.68
P 2071,2072,2073,2074	4		250.92	1,003.68	2,286.00	9,144.00	10,147.68
P 2150,2151,2152,2154	4		250.92	1,003.68	2,286.00	9,144.00	10,147.68
P 2251,2252,2253,2254	4		250.92	1,003.68	2,286.00	9,144.00	10,147.68
P 2450,2451,2452,2453,2454	5		250.92	1,254.60	2,286.00	11,430.00	12,684.60
SUBTOTAL				6,273.00		57,150.00	63,423.00
WORKERS COMP INSURANCE	8.7%			545.75			
SUBTOTAL				6,818.75		57,150.00	63,968.75
OVERHEAD & BOND	16.8%			1,145.55		9,601.20	10,746.75
SUBTOTAL				7,964.30		66,751.20	74,715.50
PROFIT	10.0%			796.43		6,675.12	7,471.55
SUBTOTAL				8,760.73		73,426.32	82,187.05
CONTINGENCY	20.0%			1,752.15		14,685.26	16,437.41
TOTAL ESTIMATED COST				10,512.88		88,111.58	98,624.46

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CONSTRUCTION COST ESTIMATE

DATE PREPARED: 7-Apr-93

SHEET OF

Project: UPDATE EXISTING EEAP

Location: FORT CARSON, COLORADO

Architect-Engineer: E M C ENGINEERS, INC., 2750 S. WADSWORTH BLVD., DENVER, CO 80227

Drawing No.:

Estimator: John Mekis

Checked by: T. FORSTER

BASIS FOR ESTIMATE

- X Code A (No design completed)
- __ Code B (Preliminary design)
- __ Code C (Final design)
- __ Other (Specify)________

GROUP 3: DISPENSARY	Quantity		Labor		Material		Total Cost
	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	
BUILDING 1007							
Valve 2-Way, 1", with electric/electronic actuator	1	EA	45.62	45.62	252.00	252.00	297.62
New Electric/Electronic Damper Actuator	4	EA	45.62	182.49	356.68	1,426.72	1,609.21
Valve 3-Way, 1-1/2", with electric/electronic actuator	1	EA	57.03	57.03	392.00	392.00	449.03
BUILDING 1150							
Valve 2-Way, 1", with electric/electronic actuator	1	EA	45.62	45.62	252.00	252.00	297.62
New Electric/Electronic Damper Actuator	4	EA	45.62	182.49	356.68	1,426.72	1,609.21
Valve 3-Way, 1-1/2", with electric/electronic actuator	1	EA	57.03	57.03	392.00	392.00	449.03
SUBTOTAL				570.27		4,141.44	4,711.71
WORKERS COMP INSURANCE	8.7%			49.61			
SUBTOTAL				619.89		4,141.44	4,761.33
OVERHEAD & BOND	16.8%			104.14		695.76	799.90
SUBTOTAL				724.03		4,837.20	5,561.23
PROFIT	10.0%			72.40		483.72	556.12
SUBTOTAL				796.43		5,320.92	6,117.35
CONTINGENCY	20.0%			159.29		1,064.18	1,223.47
TOTAL ESTIMATED COST				955.72		6,385.11	7,340.82

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1 AUG 59

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*U.S. GOVERNMENT PRINTING OFFICE 1959 0-516148

CONSTRUCTION COST ESTIMATE	DATE PREPARED 8-Apr-93	SHEET OF

Project: UPDATE EXISTING EEAP	BASIS FOR ESTIMATE
Location: FORT CARSON, COLORADO	X Code A (No design completed)
	__ Code B (Preliminary design)
	__ Code C (Final design)
Architect-Engineer: E M C ENGINEERS, INC., 2750 S. WADSWORTH BLVD., DENVER, CO 80227	__ Other (Specify)______

Drawing No.	Estimator: John Mekis	Checked by: T. FORSTER

GROUP 4: 3 CO. HQ.	Quantity		Labor		Material		Total Cost
	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	
New Pneumatic Damper Actuator	8	EA	34.22	273.73	186.00	1,488.00	1,761.73
Valve 3-Way, 2", with pneumatic actuator	1	EA	68.43	68.43	403.40	403.40	471.83
Valve 3-Way, 1", with pneumatic actuator	1	EA	34.22	34.22	250.00	250.00	284.22
Valve 2-Way, 2", with pneumatic actuator	1	EA	68.43	68.43	435.00	435.00	503.43
Valve 3-Way, 3/4", with electric/electronic actuator	1	EA	45.62	45.62	242.00	242.00	287.62
SUBTOTAL @ BUILDING				490.44		2,818.40	3,308.84
BUILDINGS:							
P 1118	1	EA	490.44	490.44	2,818.40	2,818.40	3,308.84
P 1217	1	EA	490.44	490.44	2,818.40	2,818.40	3,308.84
P 1218	1	EA	490.44	490.44	2,818.40	2,818.40	3,308.84
P 1219	1	EA	490.44	490.44	2,818.40	2,818.40	3,308.84
P 1220	1	EA	490.44	490.44	2,818.40	2,818.40	3,308.84
P 1363	1	EA	490.44	490.44	2,818.40	2,818.40	3,308.84
P 1364	1	EA	490.44	490.44	2,818.40	2,818.40	3,308.84
P 1365	1	EA	490.44	490.44	2,818.40	2,818.40	3,308.84
P 1366	1	EA	490.44	490.44	2,818.40	2,818.40	3,308.84
P 1367	1	EA	490.44	490.44	2,818.40	2,818.40	3,308.84
P 1664	1	EA	490.44	490.44	2,818.40	2,818.40	3,308.84
P 1665	1	EA	490.44	490.44	2,818.40	2,818.40	3,308.84
P 1666	1	EA	490.44	490.44	2,818.40	2,818.40	3,308.84
P 1667	1	EA	490.44	490.44	2,818.40	2,818.40	3,308.84
SUBTOTAL				6,866.16		39,457.60	46,323.76
WORKERS COMP INSURANCE	8.7%			597.36			
SUBTOTAL				7,463.52		39,457.60	46,921.12
OVERHEAD & BOND	16.8%			1,253.87		6,628.88	7,882.75
SUBTOTAL				8,717.39		46,086.48	54,803.86
PROFIT	10.0%			871.74		4,608.65	5,480.39
SUBTOTAL				9,589.13		50,695.12	60,284.25
CONTINGENCY	20.0%			1,917.83		10,139.02	12,056.85
TOTAL ESTIMATED COST				11,506.95		60,834.15	72,341.10

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PREVIOUS EDITION MAY BE USED

CONSTRUCTION COST ESTIMATE

DATE PREPARED: 7-Apr-93

SHEET OF

Project
UPDATE EXISTING EEAP

Location
FORT CARSON, COLORADO

Architect-Engineer
E M C ENGINEERS, INC., 2750 S. WADSWORTH BLVD., DENVER, CO 80227

BASIS FOR ESTIMATE
X Code A (No design completed)
_ Code B (Preliminary design)
_ Code C (Final design)
_ Other (Specify)______

Drawing No.

Estimator
John Mekis

Checked by
T. FORSTER

GROUP 5: DENTAL CLINIC, BLDG P 1227	Quantity		Labor		Material		
	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total Cost
BUILDING P1227							
Valve 2-Way, 1", with electric/electronic actuator	1	EA	45.62	45.62	252.00	252.00	297.62
New Electric/Electronic Damper Actuator	4	EA	45.62	182.49	356.68	1,426.72	1,609.21
Valve 3-Way, 1-1/2", with electric/electronic actuator	1	EA	57.03	57.03	392.00	392.00	449.03
SUBTOTAL				285.14		2,070.72	2,355.86
WORKERS COMP INSURANCE	8.7%			24.81			
SUBTOTAL				309.94		2,070.72	2,380.66
OVERHEAD & BOND	16.8%			52.07		347.88	399.95
SUBTOTAL				362.01		2,418.60	2,780.62
PROFIT	10.0%			36.20		241.86	278.06
SUBTOTAL				398.22		2,660.46	3,058.68
CONTINGENCY	20.0%			79.64		532.09	611.74
TOTAL ESTIMATED COST				477.86		3,192.55	3,670.41

ENG FORM 150
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PREVIOUS EDITION MAY BE USED

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CONSTRUCTION COST ESTIMATE	DATE PREPARED 7-Apr-93	SHEET OF

Project: UPDATE EXISTING EEAP	BASIS FOR ESTIMATE
Location: FORT CARSON, COLORADO	X Code A (No design completed) __ Code B (Preliminary design) __ Code C (Final design) __ Other (Specify)________
Architect-Engineer: E M C ENGINEERS, INC., 2750 S. WADSWORTH BLVD., DENVER, CO 80227	

Drawing No.	Estimator: John Mekis	Checked by: T. FORSTER

GROUP 6: INDOOR POOL, BLDG 1446	Quantity No. Units	Quantity Unit Meas.	Labor Per Unit	Labor Total	Material Per Unit	Material Total	Total Cost
BUILDING 1446							
Valve 2-Way, 4", with pneumatic actuator	1	EA	136.87	136.87	1,325.00	1,325.00	1,461.87
Valve 2-Way, 3", with pneumatic actuator	2	EA	79.84	159.68	1,075.00	2,150.00	2,309.68
Valve 2-Way, 1-1/4", with pneumatic actuator	1	EA	45.62	45.62	295.00	295.00	340.62
Valve 2-Way, 2-1/2", with pneumatic actuator	1	EA	79.84	79.84	1,150.00	1,150.00	1,229.84
SUBTOTAL				422.00		4,920.00	5,342.00
WORKERS COMP INSURANCE	8.7%			36.71			
SUBTOTAL				458.72		4,920.00	5,378.72
OVERHEAD & BOND	16.8%			77.06		826.56	903.62
SUBTOTAL				535.78		5,746.56	6,282.34
PROFIT	10.0%			53.58		574.66	628.23
SUBTOTAL				589.36		6,321.22	6,910.58
CONTINGENCY	20.0%			117.87		1,264.24	1,382.12
TOTAL ESTIMATED COST				707.23		7,585.46	8,292.69

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CONSTRUCTION COST ESTIMATE		DATE PREPARED 7-Apr-93	SHEET OF
Project: UPDATE EXISTING EEAP		BASIS FOR ESTIMATE	
Location: FORT CARSON, COLORADO		X Code A (No design completed)	
Architect-Engineer: E M C ENGINEERS, INC., 2750 S. WADSWORTH BLVD., DENVER, CO 80227		__ Code B (Preliminary design)	
		__ Code C (Final design)	
		__ Other (Specify)______	
Drawing No.	Estimator: John Mekis	Checked by: T. FORSTER	

GROUP 7: COMMUNITY CENTER	Quantity		Labor		Material		Total Cost
	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	
BUILDING 1526							
New Electric/Electronic Damper Actuator	4	EA	45.62	182.49	356.68	1,426.72	1,609.21
Valve 3-Way, 1", with electric/electronic actuator	3	EA	45.62	136.87	282.00	846.00	982.87
Valve 3-Way, 2", with electric/electronic actuator	1	EA	79.84	79.84	435.00	435.00	514.84
Valve 3-Way, 1-1/4", with electric/electronic actuator	1	EA	57.03	57.03	332.00	332.00	389.03
SUBTOTAL				456.22		3,039.72	3,495.94
WORKERS COMP INSURANCE	8.7%			39.69			
SUBTOTAL				495.91		3,039.72	3,535.63
OVERHEAD & BOND	16.8%			83.31		510.67	593.99
SUBTOTAL				579.22		3,550.39	4,129.62
PROFIT	10.0%			57.92		355.04	412.96
SUBTOTAL				637.15		3,905.43	4,542.58
CONTINGENCY	20.0%			127.43		781.09	908.52
TOTAL ESTIMATED COST				764.57		4,686.52	5,451.09

ENG FORM 150
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CONSTRUCTION COST ESTIMATE	DATE PREPARED 7-Apr-93	SHEET OF

Project UPDATE EXISTING EEAP	BASIS FOR ESTIMATE
Location FORT CARSON, COLORADO	X Code A (No design completed) _ Code B (Preliminary design) _ Code C (Final design) _ Other (Specify)________
Architect-Engineer E M C ENGINEERS, INC., 2750 S. WADSWORTH BLVD., DENVER, CO 80227	

Drawing No.	Estimator John Mekis	Checked by T. FORSTER

GROUP 8: MAIN LIBRARY, BLDG 1528	Quantity		Labor		Material		Total Cost
	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	
BUILDING 1528							
ALL CONTROLS OK							
SUBTOTAL				0.00		0.00	0.00
WORKERS COMP INSURANCE	8.7%			0.00			
SUBTOTAL				0.00		0.00	0.00
OVERHEAD & BOND	16.8%			0.00		0.00	0.00
SUBTOTAL				0.00		0.00	0.00
PROFIT	10.0%			0.00		0.00	0.00
SUBTOTAL				0.00		0.00	0.00
CONTINGENCY	20.0%			0.00		0.00	0.00
TOTAL ESTIMATED COST				0.00		0.00	0.00

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CONSTRUCTION COST ESTIMATE

DATE PREPARED 7-Apr-93

SHEET OF

Project
UPDATE EXISTING EEAP

Location
FORT CARSON, COLORADO

Architect-Engineer
E M C ENGINEERS, INC., 2750 S. WADSWORTH BLVD., DENVER, CO 80227

BASIS FOR ESTIMATE

X Code A (No design completed)
__ Code B (Preliminary design)
__ Code C (Final design)
__ Other (Specify)__________

Drawing No.

Estimator
John Mekis

Checked by
T. FORSTER

GROUP 9: DENTAL CLINIC, BLDG 1855	Quantity		Labor		Material		
	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total Cost
BUILDING 1855							
Valve 2-Way, 1-1/2", with pneumatic actuator	1	EA	45.62	45.62	310.00	310.00	355.62
Valve 3-Way, 2-1/2", with pneumatic actuator	1	EA	79.84	79.84	1,175.00	1,175.00	1,254.84
New Pneumatic Damper Actuator	10	EA	34.22	342.16	186.00	1,860.00	2,202.16
Valve 3-Way, 2", with pneumatic actuator	2	EA	68.43	136.87	403.40	806.80	943.67
SUBTOTAL				604.49		4,151.80	4,756.29
WORKERS COMP INSURANCE	8.7%			52.59			
SUBTOTAL				657.08		4,151.80	4,808.88
OVERHEAD & BOND	16.8%			110.39		697.50	807.89
SUBTOTAL				767.47		4,849.30	5,616.77
PROFIT	10.0%			76.75		484.93	561.68
SUBTOTAL				844.22		5,334.23	6,178.45
CONTINGENCY	20.0%			168.84		1,066.85	1,235.69
TOTAL ESTIMATED COST				1,013.06		6,401.08	7,414.14

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PREVIOUS EDITION MAY BE USED

CONSTRUCTION COST ESTIMATE	DATE PREPARED 7-Apr-93	SHEET OF

Project UPDATE EXISTING EEAP	BASIS FOR ESTIMATE
Location FORT CARSON, COLORADO	X Code A (No design completed) _ Code B (Preliminary design) _ Code C (Final design) _ Other (Specify)______
Architect-Engineer E M C ENGINEERS, INC., 2750 S. WADSWORTH BLVD., DENVER, CO 80227	

Drawing No.	Estimator John Mekis	Checked by T. FORSTER

GROUP 10: COOLING PLANT, BLDG 1864	Quantity		Labor		Material		Total Cost
	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	
BUILDING 1864							
Valve 2-Way, 6", with pneumatic actuator	3	EA	205.30	615.90	2,350.00	7,050.00	7,665.90
SUBTOTAL				615.90		7,050.00	7,665.90
WORKERS COMP INSURANCE	8.7%			53.58			
SUBTOTAL				669.48		7,050.00	7,719.48
OVERHEAD & BOND	16.8%			112.47		1,184.40	1,296.87
SUBTOTAL				781.95		8,234.40	9,016.35
PROFIT	10.0%			78.20		823.44	901.64
SUBTOTAL				860.15		9,057.84	9,917.99
CONTINGENCY	20.0%			172.03		1,811.57	1,983.60
TOTAL ESTIMATED COST				1,032.18		10,869.41	11,901.58

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1 AUG 59

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Project UPDATE EXISTING EEAP	BASIS FOR ESTIMATE X Code A (No design completed) __ Code B (Preliminary design) __ Code C (Final design) __ Other (Specify)__________
Location FORT CARSON, COLORADO	
Architect-Engineer E M C ENGINEERS, INC., 2750 S. WADSWORTH BLVD., DENVER, CO 80227	

Drawing No.	Estimator John Mekis	Checked by T. FORSTER

GROUP 11: DAY ROOM & ADMIN.	Quantity		Labor		Material		Total Cost
	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	
Valve 3-Way, 2", with electric/electronic actuator	1	EA	79.84	79.84	435.00	435.00	514.84
New Electric/Electronic Damper Actuator	2	EA	45.62	91.24	356.68	713.36	804.60
SUBTOTAL FOR TYPICAL BUILDING				171.08		1,148.36	1,319.44
BUILDINGS:							
P 1955, 1956	2	EA	171.08	342.16	1,148.36	2,296.72	2,638.88
P 2055,2056,2155,2156	4	EA	171.08	684.32	1,148.36	4,593.44	5,277.76
SUBTOTAL				1,026.48		6,890.16	7,916.64
WORKERS COMP INSURANCE	8.7%			89.30			
SUBTOTAL				1,115.78		6,890.16	8,005.94
OVERHEAD & BOND	16.8%			187.45		1,157.55	1,345.00
SUBTOTAL				1,303.24		8,047.71	9,350.94
PROFIT	10.0%			130.32		804.77	935.09
SUBTOTAL				1,433.56		8,852.48	10,286.04
CONTINGENCY	20.0%			286.71		1,770.50	2,057.21
TOTAL ESTIMATED COST				1,720.27		10,622.97	12,343.24

ENG FORM 150
1 AUG 59

*U.S. GOVERNMENT PRINTING OFFICE 1959 0-516148

PREVIOUS EDITION MAY BE USED

CONSTRUCTION COST ESTIMATE	DATE PREPARED 7-Apr-93	SHEET OF
Project: UPDATE EXISTING EEAP	BASIS FOR ESTIMATE	
Location: FORT CARSON, COLORADO	X Code A (No design completed) __ Code B (Preliminary design) __ Code C (Final design) __ Other (Specify)___________	
Architect-Engineer: E M C ENGINEERS, INC., 2750 S. WADSWORTH BLVD., DENVER, CO 80227		
Drawing No.	Estimator: John Mekis	Checked by: T. FORSTER

GROUP 12: CO ADMIN & SUPPLY	Quantity No. Units	Quantity Unit Meas.	Labor Per Unit	Labor Total	Material Per Unit	Material Total	Total Cost
Valve 2-Way, 1/2", with electric/electronic actuator	2	EA	45.62	91.24	197.00	394.00	485.24
Valve 3-Way, 2", with electric/electronic actuator	1	EA	79.84	79.84	435.00	435.00	514.84
SUBTOTAL FOR TYPICAL BUILDING				171.08		829.00	1,000.08
BUILDINGS:							
P 1957, 1958	2	EA	171.08	342.16	829.00	1,658.00	2,000.16
P 2057,2058,2157,2158	4	EA	171.08	684.32	829.00	3,316.00	4,000.32
P 2257,2258,2457,2458	4	EA	171.08	684.32	829.00	3,316.00	4,000.32
P 2557,2558	2	EA	171.08	342.16	829.00	1,658.00	2,000.16
SUBTOTAL				2,052.96		9,948.00	12,000.96
WORKERS COMP INSURANCE	8.7%			178.61			
SUBTOTAL				2,231.57		9,948.00	12,179.57
OVERHEAD & BOND	16.8%			374.90		1,671.26	2,046.17
SUBTOTAL				2,606.47		11,619.26	14,225.73
PROFIT	10.0%			260.65		1,161.93	1,422.57
SUBTOTAL				2,867.12		12,781.19	15,648.31
CONTINGENCY	20.0%			573.42		2,556.24	3,129.66
TOTAL ESTIMATED COST				3,440.54		15,337.43	18,777.97

ENG FORM 150
1 AUG 59

PREVIOUS EDITION MAY BE USED

*U.S. GOVERNMENT PRINTING OFFICE 1959 0-516148

CONSTRUCTION COST ESTIMATE

CONSTRUCTION COST ESTIMATE	**DATE PREPARED** 7-Apr-93	**SHEET OF**
Project UPDATE EXISTING EEAP		**BASIS FOR ESTIMATE**
Location FORT CARSON, COLORADO		X Code A (No design completed)
		__ Code B (Preliminary design)
Architect-Engineer E M C ENGINEERS, INC., 2750 S. WADSWORTH BLVD., DENVER, CO 80227		__ Code C (Final design)
		__ Other (Specify)________
Drawing No.	**Estimator** John Mekis	**Checked by** T. FORSTER

GROUP 13: BN ADMIN & CLRM	Quantity		Labor		Material		Total Cost
	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	
Valve 2-Way, 1-1/2", with electric/electronic actuator	1	EA	57.03	57.03	342.00	342.00	399.03
Valve 2-Way, 1", with electric/electronic actuator	2	EA	45.62	91.24	252.00	504.00	595.24
Valve 3-Way, 1-1/2", with electric/electronic actuator	1	EA	57.03	57.03	392.00	392.00	449.03
SUBTOTAL FOR TYPICAL BUILDING				148.27		896.00	1,044.27
BUILDINGS:							
P 2350, 1853	2	EA	148.27	296.54	896.00	1,792.00	2,088.54
P 2060, 2160	4	EA	148.27	593.08	896.00	3,584.00	4,177.08
P 2352, 2700	4	EA	148.27	593.08	896.00	3,584.00	4,177.08
SUBTOTAL				1,482.70		8,960.00	10,442.70
WORKERS COMP INSURANCE	8.7%			128.99			
SUBTOTAL				1,611.69		8,960.00	10,571.69
OVERHEAD & BOND	16.8%			270.76		1,505.28	1,776.04
SUBTOTAL				1,882.46		10,465.28	12,347.74
PROFIT	10.0%			188.25		1,046.53	1,234.77
SUBTOTAL				2,070.71		11,511.81	13,582.51
CONTINGENCY	20.0%			414.14		2,302.36	2,716.50
TOTAL ESTIMATED COST				2,484.85		13,814.17	16,299.02

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1 AUG 59

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PREVIOUS EDITION MAY BE USED

CONSTRUCTION COST ESTIMATE

CONSTRUCTION COST ESTIMATE	**DATE PREPARED** 7-Apr-93	**SHEET** OF
Project UPDATE EXISTING EEAP		**BASIS FOR ESTIMATE**
Location FORT CARSON, COLORADO		X Code A (No design completed)
		_ Code B (Preliminary design)
Architect-Engineer E M C ENGINEERS, INC., 2750 S. WADSWORTH BLVD., DENVER, CO 80227		_ Code C (Final design)
		_ Other (Specify)______
Drawing No.	**Estimator** John Mekis	**Checked by** T. FORSTER

GROUP 14: GYM	Quantity No. Units	Quantity Unit Meas.	Labor Per Unit	Labor Total	Material Per Unit	Material Total	Total Cost
BUILDING 2357							
Valve 3-Way, 3/4", with electric/electronic actuator	4	EA	45.62	182.49	242.00	968.00	1,150.49
Valve 3-Way, 1-1/2", with electric/electronic actuator	2	EA	57.03	114.05	392.00	784.00	898.05
New Electric/Electronic Damper Actuator	9	EA	45.62	410.60	356.68	3,210.12	3,620.72
BUILDING 1856							
Valve 3-Way, 1", with electric/electronic actuator	4	EA	45.62	182.49	282.00	1,128.00	1,310.49
Valve 3-Way, 1-1/2", with electric/electronic actuator	2	EA	57.03	114.05	392.00	784.00	898.05
New Electric/Electronic Damper Actuator	9	EA	45.62	410.60	356.68	3,210.12	3,620.72
SUBTOTAL				1,414.28		10,084.24	11,498.52
WORKERS COMP INSURANCE	8.7%			123.04			
SUBTOTAL				1,537.32		10,084.24	11,621.56
OVERHEAD & BOND	16.8%			258.27		1,694.15	1,952.42
SUBTOTAL				1,795.59		11,778.39	13,573.98
PROFIT	10.0%			179.56		1,177.84	1,357.40
SUBTOTAL				1,975.15		12,956.23	14,931.38
CONTINGENCY	20.0%			395.03		2,591.25	2,986.28
TOTAL ESTIMATED COST				2,370.18		15,547.48	17,917.66

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1 AUG 59

*U.S. GOVERNMENT PRINTING OFFICE 1959 0-516148

PREVIOUS EDITION MAY BE USED

CONSTRUCTION COST ESTIMATE	DATE PREPARED 7-Apr-93	SHEET OF

Project UPDATE EXISTING EEAP	BASIS FOR ESTIMATE
Location FORT CARSON, COLORADO	X Code A (No design completed) __ Code B (Preliminary design)
Architect-Engineer E M C ENGINEERS, INC., 2750 S. WADSWORTH BLVD., DENVER, CO 80227	__ Code C (Final design) __ Other (Specify)__________

Drawing No.	Estimator John Mekis	Checked by T. FORSTER

GROUP 15: UNIT CAHPEL	Quantity		Labor		Material		
	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total Cost
BUILDING 2359 & 1850							
New Electric/Electronic Damper Actuator	2	EA	45.62	91.24	356.68	713.36	804.60
Valve 3-Way, 2", with electric/electronic actuator	2	EA	79.84	159.68	435.00	870.00	1,029.68
Valve 3-Way, 1-1/4", with electric/electronic actuator	2	EA	57.03	114.05	332.00	664.00	778.05
Valve 2-Way, 1-1/2", with electric/electronic actuator	2	EA	57.03	114.05	342.00	684.00	798.05
Valve 3-Way, 2-1/2", with electric/electronic actuator	2	EA	91.24	182.49	1,350.00	2,700.00	2,882.49
SUBTOTAL				661.52		5,631.36	6,292.88
WORKERS COMP INSURANCE	8.7%			57.55			
SUBTOTAL				719.07		5,631.36	6,350.43
OVERHEAD & BOND	16.8%			120.80		946.07	1,066.87
SUBTOTAL				839.87		6,577.43	7,417.30
PROFIT	10.0%			83.99		657.74	741.73
SUBTOTAL				923.86		7,235.17	8,159.03
CONTINGENCY	20.0%			184.77		1,447.03	1,631.81
TOTAL ESTIMATED COST				1,108.63		8,682.21	9,790.84

ENG FORM 150
1 AUG 59

PREVIOUS EDITION MAY BE USED

*U.S. GOVERNMENT PRINTING OFFICE 1959 0-516148

CONSTRUCTION COST ESTIMATE

DATE PREPARED 7-Apr-93

SHEET OF

Project
UPDATE EXISTING EEAP

Location
FORT CARSON, COLORADO

Architect-Engineer
E M C ENGINEERS, INC., 2750 S. WADSWORTH BLVD., DENVER, CO 80227

BASIS FOR ESTIMATE

- X Code A (No design completed)
- __ Code B (Preliminary design)
- __ Code C (Final design)
- __ Other (Specify)________

Drawing No.

Estimator
John Mekis

Checked by
T. FORSTER

GROUP 16: CONS. FLD MNT SHOP	Quantity		Labor		Material		Total Cost
	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	
BUILDING 8000							
Valve 2-Way, 1-1/2", with pneumatic actuator	10	EA	45.62	456.22	310.00	3,100.00	3,556.22
Valve 3-Way, 1-1/2", with pneumatic actuator	1	EA	45.62	45.62	360.00	360.00	405.62
Valve 2-Way, 4", with pneumatic actuator	1	EA	136.87	136.87	1,325.00	1,325.00	1,461.87
Valve 3-Way, 2-1/2", with pneumatic actuator	1	EA	79.84	79.84	1,175.00	1,175.00	1,254.84
Valve 3-Way, 2", with pneumatic actuator	1	EA	68.43	68.43	403.40	403.40	471.83
SUBTOTAL				786.98		6,363.40	7,150.38
WORKERS COMP INSURANCE	8.7%			68.47			
SUBTOTAL				855.44		6,363.40	7,218.84
OVERHEAD & BOND	16.8%			143.71		1,069.05	1,212.77
SUBTOTAL				999.16		7,432.45	8,431.61
PROFIT	10.0%			99.92		743.25	843.16
SUBTOTAL				1,099.08		8,175.70	9,274.77
CONTINGENCY	20.0%			219.82		1,635.14	1,854.95
TOTAL ESTIMATED COST				1,318.89		9,810.84	11,129.73

ENG FORM 150
1 AUG 59

*U.S. GOVERNMENT PRINTING OFFICE 1959 0-516148

PREVIOUS EDITION MAY BE USED

CONSTRUCTION COST ESTIMATE	DATE PREPARED 7-Apr-93	SHEET OF

Project UPDATE EXISTING EEAP	BASIS FOR ESTIMATE
Location FORT CARSON, COLORADO	X Code A (No design completed) __ Code B (Preliminary design) __ Code C (Final design) __ Other (Specify)________
Architect-Engineer E M C ENGINEERS, INC., 2750 S. WADSWORTH BLVD., DENVER, CO 80227	

Drawing No.	Estimator John Mekis	Checked by T. FORSTER

GROUP 17: D/S ORG. MAINT	Quantity		Labor		Material		Total Cost
	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	
BUILDING 8030							
Valve 3-Way, 3/4", with pneumatic actuator	1	EA	34.22	34.22	210.00	210.00	244.22
Valve 3-Way, 1-1/4", with pneumatic actuator	1	EA	45.62	45.62	300.00	300.00	345.62
Valve 3-Way, 2", with pneumatic actuator	4	EA	68.43	273.73	403.40	1,613.60	1,887.33
SUBTOTAL				353.57		2,123.60	2,477.17
WORKERS COMP INSURANCE	8.7%			30.76			
SUBTOTAL				384.33		2,123.60	2,507.93
OVERHEAD & BOND	16.8%			64.57		356.76	421.33
SUBTOTAL				448.90		2,480.36	2,929.26
PROFIT	10.0%			44.89		248.04	292.93
SUBTOTAL				493.79		2,728.40	3,222.19
CONTINGENCY	20.0%			98.76		545.68	644.44
TOTAL ESTIMATED COST				592.55		3,274.08	3,866.63

ENG FORM 150
1 AUG 59

*U.S. GOVERNMENT PRINTING OFFICE 1959 0-516148

PREVIOUS EDITION MAY BE USED

CONSTRUCTION COST ESTIMATE	DATE PREPARED 7-Apr-93	SHEET OF

Project: UPDATE EXISTING EEAP	BASIS FOR ESTIMATE
Location: FORT CARSON, COLORADO	X Code A (No design completed)
Architect-Engineer: E M C ENGINEERS, INC., 2750 S. WADSWORTH BLVD., DENVER, CO 80227	_ Code B (Preliminary design) _ Code C (Final design) _ Other (Specify)________

Drawing No.	Estimator: John Mekis	Checked by: T. FORSTER

GROUP 18: DS MAINT SHOP	Quantity		Labor		Material		Total Cost
	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	
BUILDING 8142							
Valve 3-Way, 1/2", with pneumatic actuator	1	EA	34.22	34.22	190.00	190.00	224.22
Valve 3-Way, 1-1/2", with pneumatic actuator	1	EA	45.62	45.62	360.00	360.00	405.62
New Pneumatic Damper Actuator	4	EA	34.22	136.87	186.00	744.00	880.87
Valve 3-Way, 3/4", with electric/electronic actuator	2	EA	45.62	91.24	242.00	484.00	575.24
Valve 2-Way, 4", with pneumatic actuator	1	EA	136.87	136.87	1,325.00	1,325.00	1,461.87
SUBTOTAL				444.81		3,103.00	3,547.81
WORKERS COMP INSURANCE	8.7%			38.70			
SUBTOTAL				483.51		3,103.00	3,586.51
OVERHEAD & BOND	16.8%			81.23		521.30	602.53
SUBTOTAL				564.74		3,624.30	4,189.05
PROFIT	10.0%			56.47		362.43	418.90
SUBTOTAL				621.22		3,986.73	4,607.95
CONTINGENCY	20.0%			124.24		797.35	921.59
TOTAL ESTIMATED COST				745.46		4,784.08	5,529.54

ENG FORM 150
1 AUG 59

PREVIOUS EDITION MAY BE USED

*U.S. GOVERNMENT PRINTING OFFICE 1959 0-516148

UNIT REPAIR COSTS

***** Site Information ********		
LOCATION:	FT. CARSON, COLORADO	
PROJECT:	FT. CARSON EEAP UPDATE	
Electrician	20.67	$/Hr
Plumer	22.81	$/Hr

LOOKUP INDEX	Description	Quantity No. Units	Quantity Unit Meas	Material $ Per unit	Material Total $	Labor HRS Per Unit	Labor Total $	Total Cost $
AE100	New Electric/Electronic Valve Actuator: 1/2"-2"	1	EA	191.70	191.70	2.0	45.62	237.32
AE150	New Electric/Electronic Valve Actuator: 2" & Up	1	EA	339.70	339.70	2.0	45.62	385.32
AE200	New Electric/Electronic Damper Actuator	1	EA	356.68	356.68	2.0	45.62	402.30
AP100	New Pneumatic Valve Actuator	1	EA	181.00	181.00	1.5	34.22	215.22
AP200	New Pneumatic Damper Actuator	1	EA	186.00	186.00	1.5	34.22	220.22
EV2100	Valve 2-Way, 1", with electric/electronic actuator	1	EA	252.00	252.00	2.0	45.62	297.62
EV2125	Valve 2-Way, 1-1/4", with electric/electronic actuator	1	EA	327.00	327.00	2.5	57.03	384.03
EV2150	Valve 2-Way, 1-1/2", with electric/electronic actuator	1	EA	342.00	342.00	2.5	57.03	399.03
EV2200	Valve 2-Way, 2", with electric/electronic actuator	1	EA	467.00	467.00	3.5	79.84	546.84
EV2250	Valve 2-Way, 2-1/2", with electric/electronic actuator	1	EA	1,325.00	1,325.00	4.0	91.24	1,416.24
EV2300	Valve 2-Way, 3", with electric/electronic actuator	1	EA	670.00	670.00	4.5	102.65	772.65
EV2400	Valve 2-Way, 4", with electric/electronic actuator	1	EA	955.00	955.00	7.0	159.68	1,114.68
EV250	Valve 2-Way, 1/2", with electric/electronic actuator	1	EA	197.00	197.00	2.0	45.62	242.62
EV2600	Valve 2-Way, 6", with electric/electronic actuator	1	EA	3,250.00	3,250.00	9.5	216.70	3,466.70
EV275	Valve 2-Way, 3/4", with electric/electronic actuator	1	EA	222.00	222.00	2.0	45.62	267.62
EV3100	Valve 3-Way, 1", with electric/electronic actuator	1	EA	282.00	282.00	2.0	45.62	327.62
EV3125	Valve 3-Way, 1-1/4", with electric/electronic actuator	1	EA	332.00	332.00	2.5	57.03	389.03
EV3150	Valve 3-Way, 1-1/2", with electric/electronic actuator	1	EA	392.00	392.00	2.5	57.03	449.03
EV3200	Valve 3-Way, 2", with electric/electronic actuator	1	EA	435.00	435.00	3.5	79.84	514.84
EV3250	Valve 3-Way, 2-1/2", with electric/electronic actuator	1	EA	1,350.00	1,350.00	4.0	91.24	1,441.24
EV350	Valve 3-Way, 1/2", with electric/electronic actuator	1	EA	222.00	222.00	2.0	45.62	267.62
EV375	Valve 3-Way, 3/4", with electric/electronic actuator	1	EA	242.00	242.00	2.0	45.62	287.62
PV2100	Valve 2-Way, 1", with pneumatic actuator	1	EA	220.00	220.00	1.5	34.22	254.22
PV2125	Valve 2-Way, 1-1/4", with pneumatic actuator	1	EA	295.00	295.00	2.0	45.62	340.62
PV2150	Valve 2-Way, 1-1/2", with pneumatic actuator	1	EA	310.00	310.00	2.0	45.62	355.62
PV2200	Valve 2-Way, 2", with pneumatic actuator	1	EA	435.00	435.00	3.0	68.43	503.43
PV2250	Valve 2-Way, 2-1/2", with pneumatic actuator	1	EA	1,150.00	1,150.00	3.5	79.84	1,229.84
PV2300	Valve 2-Way, 3", with pneumatic actuator	1	EA	1,075.00	1,075.00	3.5	79.84	1,154.84
PV2400	Valve 2-Way, 4", with pneumatic actuator	1	EA	1,325.00	1,325.00	6.0	136.87	1,461.87
PV250	Valve 2-Way, 1/2", with pneumatic actuator	1	EA	165.00	165.00	1.5	34.22	199.2[illegible]
PV2500	Valve 2-Way, 5", with pneumatic actuator	1	EA	2,175.00	2,175.00	8.0	182.49	2,357.49
PV2600	Valve 2-Way, 6", with pneumatic actuator	1	EA	2,350.00	2,350.00	9.0	205.30	2,555.30
PV275	Valve 2-Way, 3/4", with pneumatic actuator	1	EA	190.00	190.00	1.5	34.22	224.22
PV3100	Valve 3-Way, 1", with pneumatic actuator	1	EA	250.00	250.00	1.5	34.22	284.22
PV3125	Valve 3-Way, 1-1/4", with pneumatic actuator	1	EA	300.00	300.00	2.0	45.62	345.62
PV3150	Valve 3-Way, 1-1/2", with pneumatic actuator	1	EA	360.00	360.00	2.0	45.62	405.62
PV3200	Valve 3-Way, 2", with pneumatic actuator	1	EA	403.40	403.40	3.0	68.43	471.83
PV3250	Valve 3-Way, 2-1/2", with pneumatic actuator	1	EA	1,175.00	1,175.00	3.5	79.84	1,254.84
PV350	Valve 3-Way, 1/2", with pneumatic actuator	1	EA	190.00	190.00	1.5	34.22	224.22
PV375	Valve 3-Way, 3/4", with pneumatic actuator	1	EA	210.00	210.00	1.5	34.22	244.22
VD100	Valve Demolition	1	EA	0.00	0.00	2.0	45.62	45.62

TAB 2

BUILDING SURVEY FORMS

This section is generally grouped by building type and numerically by the "primary" building and related buildings.

The primary buildings are:

P-1007	Dispensery
P-1118	Barracks
P-1227	Dental Clinic
P-1446	Indoor Pool
P-1526	Community Center
P-1528	Library
P-1855	Dental Clinic
P-1864	Chiller Plant
P-1955	DET Day Room
P-1957	Co. Admin./Supply
P-2350	BN Admin.
P-2357	Gymnasium
P-2359	Chapel
P-6220	Hospital Clinic
P-6230	Hospital Ward
P-8000	Maintenance

__FMEA SURVEY OBSERVATIONS__

GENERAL BUILDING DATA

BLDG #: P-1007 ~~BLDG~~ NAME: Dispensary JOB #: 124
SURVEYED BY: JOE/AJN DATE: SEPT. '92 BLDG CONTACT: ____
CONTACT TELEPHONE NUMBER: X 3510 BLDG USAGE: Dispensary
TOT BLDG AREA: 3818 SF # OF FLOORS: 1 # OF PEOPLE: / 30

BUILDING OCCUPANCY:

MON - FRI:	0700	TO	1600	FIRST SHIFT:	✓
SATURDAY:	____	TO	____	SECND SHIFT:	____
SUNDAY:	____	TO	____	THIRD SHIFT:	____
HOLIDAYS:	____	TO	____	HOLIDAYS:	____

ENVIRONMENTAL CONDITIONS:

	HEATING SETPOINTS				COOLING SETPOINTS			
	WEEKDAYS		WEEKENDS		WEEKDAYS		WEEKENDS	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
PRESENT T'STAT:	75	75	75	75	75	75	75	75
REQUIRED T'STAT:	68	55	55	55	78	—	—	—

THERMOSTAT LOCATION(S): Waiting room
HUMIDIFICATION REQUIREMENTS (RH): ____ H'STAT LOCATION(S): ____

LIGHTING:

	AREA(SF)	LAMP TYPE	#LMPS	W/SF	SCHEDULE ON	OFF
1)	____	2 lamp Troffers (F)	26x2	2184 watts	0700	1600
2)	____	8 single Wraparounds	____	336 watts	____	____
3)	____	____	Tot:	2520 watts	____	____
4)	____	____	____	0.66 w/SF	____	____

DATA SOURCE: ✓ OBSERVATION ___ASHRAE ___OTHER (est 10% on at night)
SEE ATTACHED SCHEDULE? ___Y ✓ N

ELECTRIC EQUIPMENT:

	AREA(SF)	TYPE	(KW)	W/SF	SCHEDULE ON	OFF
1)	____	TV, Cooler, misc	____	____	0700	1600
2)	____	electric	est 0.5	w/SF	____	____
3)	____	____	____	____	____	____
4)	____	____	____	____	____	____

DATA SOURCE: ✓ OBSERVATION ___ASHRAE ___OTHER (est 5% on at night)
SEE ATTACHED SCHEDULE? ___Y ✓ N

INTERNAL MASS: MATERIAL: block walls ESTIMATED MASS: M (L, M, H)

INFILTRATION: LOCATION(S): open windows, door openings – building is slightly pressurized.

ESTIMATED RATE: _____(L, M, H) or
X AIR CHANGES or
_____CFM/LIN FT CRACK

BLDG Volume = 36,382 CF

Assume no infiltration due to pressurization and use of vestibules.

*** FMEA SURVEY OBSERVATIONS ***

GENERAL BUILDING DATA

CONSTRUCTION:

WALLS:

	CONSTRUCTION COMPONENT	WIDTH	HEIGHT	NET AREA (SF)	U-VALUE
NW ~~N~~:	4" face Brick, 2 inch insulation,	34.0	10.5	357.0	0.1036
SE ~~S~~:	4" concrete block, interior	40.3	10.5	379.4	0.1036
NE ~~E~~:	Finish ↓ ↓	96.3	10.5	894.4	0.1036
SW ~~W~~:	↓	96.3	10.5	865.1	0.1036

ROOFS:

CONSTRUCTION COMPONENT	WIDTH	HEIGHT	AREA (SF)	U-VALUE
Built up roofing 1" rigid	30.3	40.3	1,221	0.13
insulation, 2" poured gypsum,	66.0	34.0	2244	0.13
1/2" Formboard air space,		Total Conditioned		
dropped ceiling.		Roof area = 3465		0.13

WINDOWS:

	AREA (SF)	TYPE	SP	DP	DRAPES
NW ~~N~~:	0	Dbl hung		✓	
SE ~~S~~:	3(14.6) = 43.8	Dbl hung / storms		✓	✓
NE ~~E~~:	8(14.6) = 116.8	↓		✓	
SW ~~W~~:	10(14.6) = 146.0	↓		✓	

1 1/2" space

U = 0.55

FLOOR TYPE: ✓ SLAB ___ CRAWL SPACE ___ BASEMENT ___ OTHER*
AREA: 3465 SF

PERIMETER: 267 LF INSULATION? ___Y X N ___IN U= ______

SPECIAL AREAS: ____________

ADDITIONAL NOTES: T'stat single set point - room temp. 74.5°F windows open (53°F outside). 5° difference f/ treatment rooms (hotter) to waiting room. Top section of windows painted shut ⇒ (43" x 49"). Front door has a vestibule entrance. Side door are not frequently utilized.

FILM #: ________ FRAME #: ________

SKETCHES:

* Specify in "Additional Notes"

Bldg No.: P-1007

*** FMEA SURVEY OBSERVATIONS ***

GENERAL BUILDING DATA

MISCELLANEOUS BASE LOADS:
DOMESTIC HOT WATER:
MANUFACTURER & MODEL Payne 150-40 PB
FUEL SOURCE ✓ NAT GAS ___ ELEC ___ OIL ___ STM GEN ___ OTHER*
SUPPLY TEMPERATURE 134 °F, DISTANCE FROM HEATER 30 FT
INPUT 180K RECOVERY RATE 151.3 OPERATING SCHEDULE Constant

EXTERIOR LIGHTING:
TYPE ______________ NO ___ SCHEDULE ___________ CONTROL _________
TYPE ______________ NO ___ SCHEDULE ___________ CONTROL _________
TOTAL KW __________
FUNCTION OF LIGHTS ___ SECURITY ___ PARKING LOT ___ ENTRY
___ OTHER*

ADDITIONAL COMMENTS: 40 gal cap DHW - The DHW heater produces hot water on demand. The burner flame is yellow indicating poor combustion. The circulation pump is frozen which prevents water flow through the heater (unless water is being used). This condition causes the heater to boil the water inside the heater tank. A storage tank (DHW) is located adjacent to the heater. Estimated heater efficiency = 50% to 60%.

FILM #: ______ FRAME #: ________________________

ADDITIONAL SKETCHES:

* Specify in "Additional Comments"

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

HEATING PLANT

PLANT DESCRIPTION:
NUMBER OF UNITS: 1
MAKE & MODEL: 1) Weil McLain CP No. 736434
2) ____
3) ____

EQUIPMENT: ✓ BOILER ___ DIRECT FIRED ___ STEAM CONV H 676-S
TYPE: ✓ STEAM ___ HW ___ CAST IRON ___ WATER TUBE, FIRE TUBE
FUEL: NAT GAS ✓ ELECTRIC _____ OIL _____ OTHER ____

MULTIPLE UNIT OPERATION SEQUENCE:
SERIES ____ PARALLEL ____

BURNER STAGES: One

FIRING RATE/FUEL: #1: 450 MBH (Max & Min) #2: ____

BURNER TYPE: ✓ POWER: MFR Peabody Gordon-Piatt MOD No. R6.1-GO-03
BLOWER ___/__/___-____A .33 HP @ ______ CFM
CONTRL 120/5/1-____A
___ATMOS: MFR ____ MOD No. ____

___HOT WATER: SUPPLY SIZE _______ TEMPERATURE _____ PRESSURE ____ PSI
RETURN SIZE _______ TEMPERATURE _____ PRESSURE ____ PSI
✓ STEAM: HEADER SIZE _______ TEMPERATURE _____ PRESSURE 4-7 PSI

RATED CAPACITY: MAX BTUH IN ____ steam 306.1 MBH
MAX BTUH OUT 408 KBTU water 354.8 MBH

CONTROLS: TYPE electric
CONDITION good

PLANT AUXILIARIES:
PUMPS: HW 1) ____/__/____-____A ________ HP
2) ____/__/____-____A ________ HP
COND 1) ____/__/____-____A .33 HP
2) ____/__/____-____A .33 HP

FANS: 1) ____/__/____-____A ________ HP @ ________ CFM
2) ____/__/____-____A ________ HP @ ________ CFM
3) ____/__/____-____A ________ HP @ ________ CFM

OTHER 1) ____/__/____-____A ________ HP
2) ____/__/____-____A ________ HP

AUX OPERATING SCHEDULES:
PUMPS: HW 1) ON_____ OFF_____ 2) ON_____ OFF_____
COND 1) ON_____ OFF_____ 2) ON_____ OFF_____
FANS: 1) ON_____ OFF_____ 2) ON_____ OFF_____ 3) ON_____ OFF_____
OTHER: 1) ON_____ OFF_____ 2) ON_____ OFF_____

AUXILIARY FUEL USED: #2 OIL ______ NAT GAS _____ OTHER ______

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

OPERATING SCHEDULE: DATE STARTED 15 SEP
DATE STOPPED 15 MAY

	MON - FRI	SAT	SUN
* PRESENT OPERATION:	____ TO ____	____ TO ____	____ TO ____
* REQUIRED OPERATION:	____ TO ____	____ TO ____	____ TO ____

OTHER PLANT COMMENTS: ✓The boiler fires to maintain 4 to 7 psi steam pressure.

FILM #: _______ FRAME #: _______

SKETCH:

* --> Disregard if the item is the same as the GENERAL BUILDING DATA.

Bldg No.: P-1007

***** FMEA SURVEY OBSERVATIONS *****

MECHANICAL EQUIPMENT DATA

AIR HANDLING UNITS:
MANUFACTURER Trane Climate Changer MODEL No. 2-12
AHU NUMBER: 1 AHU TYPE: Multi zone Blow - through (3 zones)
LOCATION: Mech room SPACE SERVED: disp.

FAN DATA:
SUPPLY FAN HP: 1 SUPPLY CFM: 3300 STATIC PRESS: 1"
RETURN FAN HP: None RETURN CFM: ___ STATIC PRESS: ___
EXHAUST FAN HP: None EXHAUST CFM: ___ STATIC PRESS: ___
MOTOR STARTER: MNT __ MOM __. SWITCH: P.B. __ H.O.A. __ DISCON __

COILS:
HEATING: HW __ STM ✓ DIRECT FIRED --> NG __ OIL __ ELC __ OTHER __
COOLING: CW __ DX ✓. FROM CHILLER ______, FROM DX UNIT ✓
REHEAT: # OF COILS ___ TYPE ___. RECOOL: # OF COILS ___ TYPE ___
HUMIDITY: STM X SPRAY __ ELC __. ~~HW/CW~~ STEAM COIL VALVES: 2 WAY X, 3 WAY __

DAMPERS:
O.A. DAMPER: __ (Y, N), IF YES, FIXED 30%, MODULATING 30% TO ? % min. setting
R.A. DAMPER: __ (Y, N), IF YES, FIXED __%, MODULATING __% TO __%
E.A. DAMPER: __ (Y, N), IF YES, FIXED __%, MODULATING __% TO __%
ECONOMIZER: __ (Y, N), IF YES, OA ✓ ~~RA __ ENTHALPY~~ COULD NOT GET ECONOMIZER TO OPERATE.
OA LEAKAGE: ____% ~~IF NO, CAN ECONOMIZER BE ADDED~~
HONEYWELL MODUTROL ACTUATOR ON O.A./R.A. DAMPER
FILTER CONDITION: ✓ GOOD ___ ~~FAIR~~ ___ ~~POOR~~

SYSTEM OPERATION:

	MON - FRI			SAT			SUN		
*PRESENT OPERATION:	0001	TO	2400	0001	TO	2400	0001	TO	2400
*REQUIRED OPERATION:	___	TO	___	___	TO	___	___	TO	___

	HEATING SETPOINTS				COOLING SETPOINTS			
	WEEKDAYS		WEEKENDS		WEEKDAYS		WEEKENDS	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
*PRESENT TEMP:	___	___	___	___	___	___	___	___
*REQUIRED TMP:	___	___	___	___	___	___	___	___

HUMIDIFICATION REQUIREMENTS (RH): ____ HUMIDISTAT LOCATION: ____

SYSTEM SETPOINTS: MIXED AIR ~~50~~ 65 °F, HOT DECK ___ °F, COLD DECK ___ °F
TIME CLOCK: ___ (Y, N), ~~IF~~ YES, IS IT OPERATIONAL ___ (Y, N)

CONTROLS: PNEUMATIC ______, ELECTRIC ✓, PNEUMATIC/ELEC ______

EQUIPMENT CONDITION: EXCELLENT(E), GOOD(G), POOR(P) T'STAT G
H'STAT ___ COMPR ___ DAMPERS F LINKAGES P FANS F SHEAVES ___
VALVES ___ ACTUATORS F BELTS F MIXING BOX P
OTHER ___ MIXED AIR CONTROLLER DOES NOT APPEAR TO OPERATE.
COMMENTS: ~~50°~~ 65 Mixed Air / Cooling coil on @ 65° and down @ 50°F
✓3 fans on condenser - 1/2 h.p./ea. SIZE = 10.7 TONS
Compressor 3 phase/60 cyc/48.8 A @ 230 V
RAUB C113 A RLA

Bldg No.: P-1007

Page 6 of 7

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

AIR HANDLING UNITS:

CONTROL STRATEGY: 3 zones → N.E., SW. and S.E., all electric controls. ACTUATORS ARE HONEYWELL MODUTROL (24V). The DX compressors are activated when a sensor on the cold deck activates a solenoid valve on the refrigerant line. Cooling is called when the cold deck reaches 65°F and is off when the cold

ADDITIONAL AHU/SYSTEM COMMENTS: deck drops down to 50°F. This condition causes frequent cycling of the compressor.

When OA temp reaches 80°F, the outside air dampers close to their minimum position (30%). A hand operated minimum positioner is located on the unit.

The steam valve on the AHU is leaking so that steam reaches the coil when ~~not~~ none is called. STEAM VALVE IS OPERABLE; 1-1/2" HONEYWELL CONTROL VALVE. BOILER WAS OFF, COULD NOT VERIFY LEAKY VALVE.

FILM #: ______ FRAME #: ______

SYSTEM SKETCH:

Bldg No.: P-1007

GENERAL ENERGY CONSERVATION OPPORTUNITY CHECKLIST

Bldg Name: Dispensary Bldg #: P-1007 Contact: McRae Phone #: X 3510 Surveyed By: [illegible]/RF Date: 11/20/87

ECO TITLE	ANNEX A	DATE	ANNEX B	DATE	COMMENTS
ATION	A1		# B01	✓	Maybe walls & roof
STORM WINDOWS or DOUBLE GLAZING	A2		# B02		N/A
WEATHER STRIPPING and CAULKING	A3		# B03		N/A - building is pressurized
INSULATED PANELS	A4		# B04		N/A
VESTIBULES or REVOLVING DOORS	A5		# B05		exist
LOAD DOCK SEALS (Strip Door or Air Cu)	A6		B06		N/A
REDUCTION of GLASS AREA	A7		B07		N/A
REPLACE KITCHEN LIGHT FIXTURES	A8		# B08		N/A
SHUTDOWN DHW or MOD CTRLS (Non FH)	A9		B09	✓	Install high eff heater
REDUCE LIGHTING LEVELS	A10		# B11		N/A
REPLACE INCANDESCENT LIGHTING	A11		# B12		N/A
USE MORE EFFICIENT LIGHTING SOURCE	A12		# B10		N/A
HIGH EFFICIENCY MOTOR REPLACEMENT	A13		B13	✓	on MZ unit
NIGHT SETBACK/SETUP THERMOSTATS *	A14		# B14	✓	3 T-stats
INFRARED HTRS (Motor Rep Shops & Whse)	A15		# B15		N/A
ECONOMIZER CYCLES (Dry Bulb Type)	A16		# B16		exist but require upgrade See B32
CONTROL HOT WATER CIRC PUMP *	A17		# B17		N/A off hours
FM RADIO CONTROLS	A18		B18		?
RADIATOR CONTROLS	A19		B19		N/A
DECENTRALIZE DHW HTRS (POU Htrs) *	A20		B		N/A
HEAT RECLAIM from HOT REFRIG GAS	A21		# B20	✓	from small Trane unit to DHW
REDUCE AIR FLOW *	A22		# B21		reduce minimum OA (See B32)
PREVENT AIR STRATIFICATION *	A23		# B22		N/A
INSTALL TIME CLOCKS	A24		B23		N/A - pump inoperative.
CHILLER REPLACEMENT	A25		B		N/A
REPLACE ABSORPTION CHILLER	A26		B38		N/A
INSULATE STEAM LINES	A27		B26		N/A
RETURN CONDENSATE	A28		B27		N/A
TRANSFORMER OVERVOLTAGE	A29		B31		?
TRANSFORMER LOADING	A30		B30		?
REVISE OR REPAIR HVAC CONTROLS	A31		B32	✓	upgrade all HVAC controls
WASTE HEAT RECOVERY *	A32		B33		N/A
ADD ADDITIONAL LIGHT SWITCHES	A33		B35		N/A
HVAC INIT/BLDGS WITH SEPARATE BOILERS	A34		# B37	✓	Replace w/ high eff. boiler
STANDARD SOLUTIONS for EXT LIGHTS	A35		# B36		N/A
BOILER OXYGEN TRIM CONTROLS	A		B24		?
REVISE BOILER CONTROLS	A		B25		?
PRE-HEAT DHW	A		B28		N/A
HEAT PUMPS	A		# B29	✓	Try this
EMCS	A		B39	✓	
HOT WATER RECIRC PUMPS	A		M40,17		
HPS STREET LIGHTS	A		M41		
ELECTRIC OUTLET INSULATION	A		M42		

<*> Denotes ECO's studied by Burns & McDonnel
<#> Denotes ECO's common to Military Family Housing

**** FMEA SIMILAR BUILDINGS SURVEY FORM ****

9/92 AJN

GENERAL BUILDING DATA

BLDG #: 1150 (P) BLDG NAME: DISPENSARY DATE: ~~2-15-85~~ JOB #: 124
SURVEYED BY: ~~PK/RT~~ BLDG CONTACT: ONLEY TELEPHONE EXT: 5356
BLDG USE: DISPENSARY # FLOORS: 1 # PEOPLE: 10 BLDG AREA: 4047 SF

BLDG OCCUPANCY: S M T W Th F S 0700 TO 1600
S M T W Th F S ____ TO ____

T'STAT SETTING: HTG: 75 / ____ AUTO SETBACK: N / Y: ____/____
CLG: ____ / 76
Temperature,Future,inside,Occupied: 70/78 Temp Present: ____
Temperature,Future,inside,Unoccupied: 55/- AirChange/hR: Ø

ARCHITECTURAL

	AREA	U-value	UA
WALL	2,745	.161	442
GLASS	346	1.176	407
ROOF	4047	.108	437
FLOOR	280	.86	241
SUM	7,418		1,527

Avg. Floor-Ceiling Height: 8.6' Floor type: SLAB Insulated: Y/N
Window frame type: Alum Wood Operable sections: Y / N
Window size: See Below SP DP CURT Infiltration L M H
Entry doors: 5 # OH Doors: Ø % of Area Conditioned: ____

LIGHTING: Type: FLOURESCENT Watts/SF: .45 Util Frac: ____

ELECTRICAL EQUIP: OFFICE KW/Unit: ____ #Units: ____ Util Frac: ____

DHW: TYPE: NG ELEC/CONV Supply Temp: 140° GAL/Person-Day: ____
AFUE: ____ %

MECHANICAL

		HEATING	COOLING
	Primary System:	HTHW → HW	DX COOLING
	Fuel:	NAG (CP)	ELEC
	Capacity:	180 KBTUH	20 Tons
	est.Peak Del.Effic:	63.1%	
	Months ON:	8	4
	Hours ON:	5808	2952
AHUs	Hp:	1	1
	cfm:	4740	4790
	Min OA:	50%	
	Economizer:	DUMB	DUMB

MISC: 2 Zones - East/West
Zone dampers controlled by Summer/winter T-STAT Summer - if Temp. drops dampers close
Winter - if Temp. drops dampers open.
VESTIBULES EXIST (FRONT AND BACK) Honeywell Elect. Controls - Modutrol Actuators.
WINDOWS: 4-46" X 62" O.A. Temp control on Converter set at 62°F
25-32" X 48" HW Temp. set at 155°F
1-SZU R.A. Temp. control set at 70°F, Refrig. compressor runs below 70°F R.A. Temp. (OVER)

FT CARSON EEAP

BLDG. 1150

- AHU runs continuously
- T-STAT opens & closes 3-Way Htg. Valve to maintain proper Temp. in Space.
- Htg. T-STAT set at 65°F
- Zone Damper T-STATS set at 68°F
- STAFF COMPLAINS OF DRASTIC TEMPERATURE SWINGS IN THE BUILDING.

***** FMEA SURVEY OBSERVATIONS *****

3/29/93 GM

GENERAL BUILDING DATA

4th Replacement Co ACAP G1/AG Retirement Services

BLDG #: P1118 BLDG NAME: ~~BARRACKS~~ JOB #: 124
SURVEYED BY: RDC DATE: ~~10/11/84~~ BLDG CONTACT: 1st Sgt
CONTACT TELEPHONE NUMBER: ______ BLDG USAGE: ~~Barracks~~
TOT BLDG AREA: 51800 SF # OF FLOORS: 3 # OF PEOPLE: 350
(Note: Drawings show 50,494 SF)

~~BUILDING OCCUPANCY:~~ See Field Notes					
MON - FRI:	16:30 TO 06:00	FIRST SHIFT:	~~100~~	51
MON-FRI ~~SATURDAY:~~	06:00 TO 1630	SECND SHIFT:	~~350~~	0
SATURday - SUNDAY:	00 TO 2400	THIRD SHIFT:	≈ ~~350~~	0
HOLIDAYS:	____ TO ____	HOLIDAYS:	_____	

ENVIRONMENTAL CONDITIONS:

	HEATING SETPOINTS				COOLING SETPOINTS			
	WEEKDAYS		WEEKENDS		WEEKDAYS		WEEKENDS	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
PRESENT T'STAT:	70	70	70	70				
REQUIRED T'STAT:	65	55	65	55				

THERMOSTAT LOCATION(S): ______
HUMIDIFICATION REQUIREMENTS (RH): ____ H'STAT LOCATION(S): ______

LIGHTING:

	AREA(SF)	LAMP TYPE	#LMPS	W/SF	SCHEDULE
1)		INC			ON 4:30 OFF 22:00
2)		INC			ON 4:30 OFF 22:00
3)		INC			ON 4:30 OFF 22:00
4)		FLUOR			ON 4:30 OFF 22:00

DATA SOURCE: ✓ OBSERVATION ___ASHRAE ___OTHER
SEE ATTACHED SCHEDULE? ___Y ___N

See page 3 of 7

≈10% ON 24 hr/day

ELECTRIC EQUIPMENT:

	AREA(SF)	TYPE	(KW)	W/SF	SCHEDULE
1)		Personal Equipment		~~0.2~~ For avg Room	ON______ OFF______
2)		USED 0.044 W/FT²		See Field Notes	ON______ OFF______
3)		For ENTIRE Building			ON______ OFF______
4)		✓ Used .5 W/SF for Mess hall area			ON______ OFF______

DATA SOURCE: ___OBSERVATION ___ASHRAE ___OTHER
SEE ATTACHED SCHEDULE? ___Y ___N

INTERNAL MASS: MATERIAL: CONCRETE ESTIMATED MASS: _ (L, M, H)

INFILTRATION: LOCATION(S): Windows in toilets open most of the time. Some frames on windows had poor fit (not all) Should be Fixed under OEM

ESTIMATED RATE: _____(L, M, H) or
✓ AIR CHANGES or
_____CFM/LIN FT CRACK

Building Volume = 504,900 CF

0.05 AC due to doors (∅ at night)
0.50 AC due to open windows day (0.1 Night)
0.70 AC due to window cracks & door cracks

1.25 Air Changes day 0.8 Air Changes Night

*** FMEA SURVEY OBSERVATIONS ***

GENERAL BUILDING DATA

CONSTRUCTION:

WALLS: ✓

	CONSTRUCTION COMPONENT	WIDTH	HEIGHT	(GROSS) AREA (SF)	U-VALUE
NW	Brick & Concrete Block			6,225.3	0.288
SE	" " "			5,922.8	0.288
NE	" " "			9,910.4	0.288
SW	" " "			9,825.7	0.288

ROOFS: ✓

CONSTRUCTION COMPONENT	WIDTH	HEIGHT	AREA (SF)	U-VALUE
Build up Roof with			20,000	0.13
1.5" RIGID INSULATION				
Concrete				

WINDOWS: ✓ U=1.18

	AREA (SF)	TYPE	SP	DP	DRAPES
NE	2,104.6	Double Hung Metal	✓		
SE	1,157.2	" " "	✓		
SW	2,189.3	" " "	✓		
NW	854.7	" " "	✓		

FLOOR TYPE: ___ SLAB ✓ CRAWL SPACE ✓ BASEMENT ___ OTHER*
AREA: 18,518 SF

PERIMETER: ≈870 LF INSULATION? ___Y ✓ N ___IN ___________

SPECIAL AREAS: Boiler room not simulated (NO HEAT LOSS From Build)

ADDITIONAL NOTES: Personal radios and clocks Estimated AT .2 W/ft² in Dorms USE .15 W/FT² AS Averge For Buildings

Windows Are left open to rid the excessive heat in winter time. This is due to lack of control of baseboard heaters.

FILM #: ________ FRAME #: ______________________

SKETCHES:

GROSS WALL AREAS

	Zone 1	Zone 2
NE	5,970	847
SE	5,923	0
SW	5970	847
NW	6,225	638

* Specify in "Additional Notes"

Bldg No.: 1118

*** FMEA SURVEY OBSERVATIONS ***

GENERAL BUILDING DATA

LIGHTING SCHEDULE

Page ___ of ___

AREA: (A) MAIN ____________ SF (B) MEZZ ____________ SF
(A) ________ X ________ (B) ________ X ________

DATA SOURCE: ___ DRAWINGS ___ SURVEY TOUR

Mark	#lamps	W/Fix	#Fix	Flr #	Comments	(Estimated Usage)
I	65	100	65	1st	Incandescent	75% on day/night
F	76	38	38	Former Mess area	Fluorescent	100% on day/10% night
F	156	38	78	2nd	Fluorescent	50% on day/50% nigh
I	10	100	10	2nd	Incandescent	50% on day/100% on ni
F	96	38	48	3rd	Fluorescent	50% on day/50% on ni
I	10	100	10	3rd	Incandescent	50% on day/100% on ni

(A) TOTAL: Day / Nite 8,269 / 9,269 Watts/ 46,014 SF= Day / Night .18 / .20 W/SF ALL AREAS (except mess)

(B) TOTAL: 1,444 / 144.4 Watts/ 4,480 SF= .32 / 0.032 W/SF MESS AREA

ADDITIONAL NOTES:

Bldg. No.: 111 8

*** FMEA SURVEY OBSERVATIONS ***

GENERAL BUILDING DATA

MISCELLANEOUS BASE LOADS:
DOMESTIC HOT WATER:
MANUFACTURER & MODEL Converter
FUEL SOURCE ✓ NAT GAS ___ ELEC ___ OIL ___ STM GEN ___ OTHER*
SUPPLY TEMPERATURE 120 °F, DISTANCE FROM HEATER _____ FT
INPUT ______ RECOVERY RATE _______ OPERATING SCHEDULE Constant

EXTERIOR LIGHTING:
TYPE INC NO 4 SCHEDULE 24 hours CONTROL manual
TYPE ____________ NO ___ SCHEDULE __________ CONTROL (100 watt)
TOTAL KW 0.400
FUNCTION OF LIGHTS ___ SECURITY ___ PARKING LOT ___ ENTRY
___ OTHER*

ADDITIONAL COMMENTS: One Light fixture AT each door, only 4 had bulbs IN place

✓

MULTI-ZONE UNIT SEQUENCE OF OPERATION

1. WHEN THE UNIT IS OFF, THE MIN. OA, MAX. OA, AND EA DAMPERS ARE CLOSED, THE RA DAMPER IS OPEN.
PROVIDE TEMPERATURE INDICATION DEVICE ON THE FACE OF THE CONTROL PANEL FOR THE FOLLOWING: OA, MA, RA, HOT DECK, COLD DECK, CHILLED WATER SUPPLY & RETURN, AND HOT WATER SUPPLY.
PROVIDE A DUCT MOUNTED THERMOMETER FOR EACH ZONE AFTER THE DISCHARGE MIXING DAMPERS.
2. A 7-DAY TIME CLOCK WITH 6-HOUR MANUAL OVERRIDE TIMER FOR NIGHT OPERATION SHALL START THE SUPPLY FAN, OPEN THE MIN. OA DAMPER & ALLOW OPERATION OF CHILLED WATER PUMP WHENEVER THE BUILDING IS OCCUPIED. PROVIDE AN H-O-A SWITCH MOUNTED INSIDE THE CONTROL PANEL FOR MANUAL OPERATION OF THE AIR HANDLING SYSTEM. PROVIDE A CLEARLY LABELLED "EMERGENCY STOP" SWITCH WITH RED BUTTON LOCATED ON THE FACE OF THE CONTROL PANEL FOR SHUT DOWN OF THE ENTIRE AIR HANDLING SYSTEM & CHILLED WATER PUMP.
3. ZONE THERMOSTATS SHALL MODULATE THE DISCHARGE MIXING DAMPERS FOR EA[illegible] ALL HOT DECK ZONE DAMPERS SHALL BE NORMALLY OPEN. ALL COLD DECK [illegible] DAMPERS SHALL BE NORMALLY CLOSED. THE OUTPUT SIGNAL FROM EACH ZO[illegible] THERMOSTAT SHALL GO TO A HIGH-LOW SELECTOR SWITCH.
4. THE HOT DECK TEMPERATURE SHALL BE RESET BY A HOT DECK CONTROLLER BAS[illegible] THE ZONE REQUIRING THE MOST HEATING. A HIGH LIMIT THERMOSTAT SHALL PREV[illegible] THE HOT DECK TEMPERATURE FROM EXCEEDING 175°F. THE HOT DECK CONTROLLER SHA[illegible] MODULATE THE 3-WAY VALVE ON THE HOT WATER SYSTEM TO ACCOMPLISH THIS FUNCTION.
5. THE COLD DECK TEMPERATURE SHALL BE RESET BY A COLD DECK CONTROLLER BASED ON THE ZONE REQUIRING THE MOST COOLING. A LOW LIMIT THERMOSTAT SHALL PREVENT THE COLD DECK TEMPERATURE FROM FALLING BELOW 55°F. THE COLD DECK CONTROLLER SHALL MODULATE THE MAX. OA, RA, AND EA DAMPERS IN SEQUENCE WITH A 3-WAY VALVE IN THE CHILLED WATER LINE.
6. THE MAX. OA, RA, AND EA DAMPERS SHALL BE MODULATED BY THE COLD DECK CONTROLLER SUBJECT TO AN OA/RA TEMPERATURE CONTROLLER WHICH SHALL PLACE THE MAX. OA, RA, EA DAMPERS IN THEIR NORMAL POSITION WHENEVER OA DRY BULB EXCEEDS RA DRY BULB.
7. A FIRESTAT (FS) IN RETURN DUCT AND ONE IN THE SUPPLY DUCT SHALL STOP THE AIR HANDLING UNIT AND RETURN ALL DAMPERS AND VALVES TO THEIR NORMAL POSITION UPON DETECTION OF A TEMPERATURE RISE ABOVE 125°F. A FREEZESTAT IN THE MIXED AIR SECTION SHALL STOP THE ENTIRE AIR HANDLING UNIT & RETURN ALL DAMPERS AND VALVES TO THEIR NORMAL POSITION WHEN THE TEMPERATURE FALL BELOW 42°F.

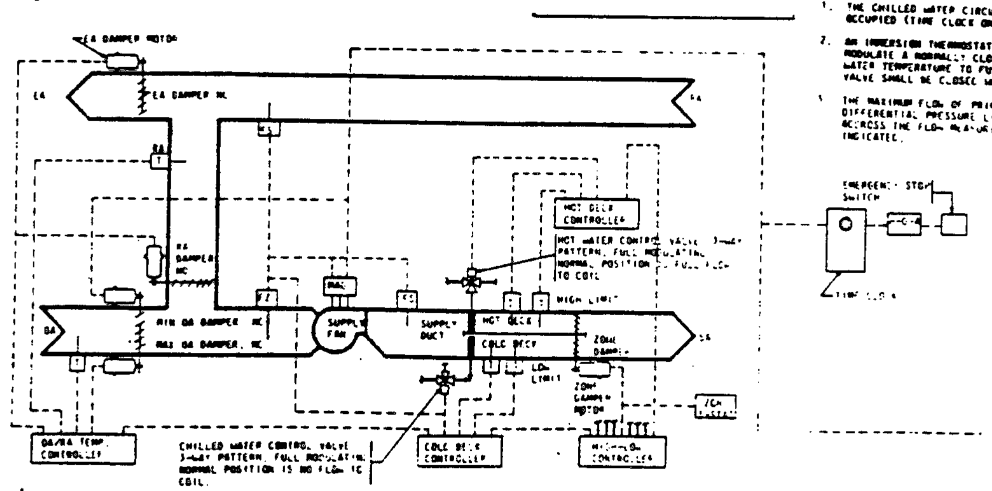
FILM #: ______ FRAME #: ____________________

ADDITIONAL SKETCHES:

CHILLED WATER SYSTEM SEQUENCE OF OPERATION

1. THE CHILLED WATER CIRCULATING PUMP SHALL OPERATE WHENEVER THE BUILDING IS OCCUPIED (TIME CLOCK ON) & THE OUTSIDE AIR TEMPERATURE IS ABOVE 70°F.
2. AN IMMERSION THERMOSTAT LOCATED IN THE CHILLED WATER RETURN LINE SHALL MODULATE A NORMALLY CLOSED 2-WAY VALVE FROM FULLY CLOSED AT 48°F RETURN WATER TEMPERATURE TO FULLY OPEN AT 56°F RETURN WATER TEMPERATURE. THE VALVE SHALL BE CLOSED WHEN PUMP IS OFF.
3. THE MAXIMUM FLOW OF PRIMARY CHILLED WATER SHALL BE LIMITED [illegible] DIFFERENTIAL PRESSURE LIMIT CONTROLLER [illegible] INLET & OUTLET PRESSURE ACROSS THE FLOW MEASURING DEVICE. FLOW SHALL BE LIMITED TO CAPACITY AS INDICATED.

✓



MULTIZONE UNIT CONTROL DIAGRAM

CHW

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

UNITARY HEATING EQUIPMENT:

UNIT NO.	TYPE	OUTPUT CAPACITY	HEATING SOURCE	CFM	HP	STARTER & CONTROL	SETPOINT

All Base board Radiators receive hot water from the steam converter. The radiators do not have individual control, instead the hot water is reset using an OA reset Controller. The OA reset controller does not take into account internal gains, solar gains and the thermal mass of the building. There are 174 individual baseboard heaters in the building.

FILM #: ______ FRAME #: ______

NOTES: TYPE --> unit heater, unit ventilator, duct furnace, wall furnace, etc.
HEATING SOURCE --> electric, gas fired, oil, steam, hot water, etc.
STARTER & CONTROL --> momentary, maintained, line v stat, 24 v stat, self contained, etc.

Bldg No.: 1118

__FMEA_SURVEY_OBSERVATIONS__

MECHANICAL_EQUIPMENT_DATA

✓AIR HANDLING UNITS:
MANUFACTURER ______________________ MODEL No. ____________________
AHU NUMBER: _____ AHU TYPE: 3 ZONE MZ
LOCATION: OLD KITCHEN/MESS SPACE SERVED: OFFICE & ADMIN & Day Room

✓FAN DATA:
SUPPLY FAN HP: 3 SUPPLY CFM: 4170 STATIC PRESS: 1.2 " H_2O
RETURN FAN HP: ___ RETURN CFM: _____ STATIC PRESS: ___
EXHAUST FAN HP: ___ EXHAUST CFM: _____ STATIC PRESS: ___
MOTOR STARTER: MNT __ MOM __. SWITCH: P.B. __ H.O.A. __ DISCON __

✓COILS:
HEATING: HW __ STM __ DIRECT FIRED --> NG __ OIL __ ELC__ OTHER __
COOLING: CW ✓ DX __. FROM CHILLER Central Plant, FROM DX UNIT _______
REHEAT: # OF COILS ___ TYPE _____. RECOOL: # OF COILS ___ TYPE ____
HUMIDITY: STM __ SPRAY __ ELC __. HW/CW COIL VALVES: 2 WAY __, 3 WAY __

DAMPERS:
O.A. DAMPER: __ (Y, N), IF YES, FIXED __%, MODULATING 12% TO 88%
R.A. DAMPER: __ (Y, N), IF YES, FIXED __%, MODULATING 12% TO 88%
E.A. DAMPER: __ (Y, N), IF YES, FIXED __%, MODULATING __% TO __% Relief only
ECONOMIZER: __ (Y, N), IF YES, OA ✓ RA __ ENTHALPY __
OA LEAKAGE: ≈ ~~.05~~ % 5.0 IF NO, CAN ECONOMIZER BE ADDED _________

FILTER CONDITION: ___GOOD ✓ FAIR ___POOR

SYSTEM OPERATION:

	MON - FRI			SAT			SUN		
*PRESENT OPERATION:	0	TO	24	0	TO	24	0	TO	24
*REQUIRED OPERATION:	_____	TO	_____	_____	TO	_____	_____	TO	_____

	HEATING SETPOINTS				COOLING SETPOINTS			
	WEEKDAYS		WEEKENDS		WEEKDAYS		WEEKENDS	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
*PRESENT TEMP:	72	72	72	72	72	72	72	72
*REQUIRED TMP:	65	55	65	55	65	55	65	55

HUMIDIFICATION REQUIREMENTS (RH): ____ HUMIDISTAT LOCATION: _____

SYSTEM SETPOINTS: MIXED AIR ___°F, HOT DECK ___°F, COLD DECK ___°F
TIME CLOCK: ___ (Y, N), IF YES, IS IT OPERATIONAL ___ (Y, N)

CONTROLS: PNEUMATIC ______, ELECTRIC ______, PNEUMATIC/ELEC ✓

EQUIPMENT CONDITION: EXCELLENT(E), GOOD(G), POOR(P) T'STAT ___
H'STAT ___ COMPR ___ DAMPERS ___ LINKAGES ___ FANS ___ SHEAVES ___
VALVES ___ ACTUATORS ___ BELTS ___ MIXING BOX ___
OTHER ___

COMMENTS: No energy to heating coil. Brings in outside air 24 hr/day all year. Cooling Coil has energy in summer. ~~Time clock controls supply fan operation.~~ AHU runs continuously.
PNEUMATIC HTG & CLG COIL VALVES – APPROX 2" & 1" – 3-WAY

Bldg No.: 1118

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

HEATING PLANT

PLANT DESCRIPTION:
NUMBER OF UNITS: 2 ✓
MAKE & MODEL: 1) KEWANEE 2,871,000 BTU RATING
2) Replaced ~~KEWANEE 2,871,000 BTU RATING~~
3) Rite Steam Boiler Mod. 450S 4,500,000 BTUH

EQUIPMENT: ✓ BOILER ___ DIRECT FIRED ___ STEAM CONV
TYPE: ___STEAM ✓ HW ___CAST IRON ___WATER TUBE, FIRE TUBE
FUEL: NAT GAS ✓ ELECTRIC _____ OIL _____ OTHER ____________

MULTIPLE UNIT OPERATION SEQUENCE:
SERIES ____________ PARALLEL Rite Boiler See Controls Dwg. UL A900
Gas-Fired Boiler Assembly No. W-523273 Firing Sequence Lo-Hi-Lo
BURNER STAGES: Second boiler only used in coldest part of yr.

FIRING RATE/FUEL: #1: ____________ #2: ____________

BURNER TYPE: ✓ POWER: MFR KEWANEE ________ MOD No. ________
BLOWER ____/__/___-____A ? HP @ ? CFM
CONTRL ____/__/___-____A
___ATMOS: MFR ____________ MOD No. ________

___HOT WATER: SUPPLY SIZE _______ TEMPERATURE _____ PRESSURE ____PSI
RETURN SIZE _______ TEMPERATURE _____ PRESSURE ____PSI
___STEAM: HEADER SIZE _______ TEMPERATURE _____ PRESSURE ____PSI

RATED CAPACITY: MAX BTUH IN ~~2,871,000~~ 4,500,000 BTUH
MAX BTUH OUT 3,600,000 BTUH ≈ 80% Efficient

CONTROLS: TYPE APPROX 2" CONVERTER VALVE (REPL) TELTEC OP (OK)
CONDITION ____________

PLANT AUXILIARIES:
PUMPS: HW 1) ____/__/____-____A ✓ Pumps (2) (1½) hp HP
2) ____/__/____-____A ______ HP 1½ HP
COND 1) ____/__/____-____A (2) ~~(3)~~ HP
2) ____/__/____-____A ⅓ HP
Sump pump

FANS: 1) ____/__/____-____A ______ HP @ ______ CFM
2) ____/__/____-____A ______ HP @ ______ CFM
3) ____/__/____-____A ______ HP @ ______ CFM

OTHER 1) ____/__/____-____A ______ HP
2) ____/__/____-____A ______ HP

AUX OPERATING SCHEDULES: ON DEMAND
PUMPS: HW 1) ON_____ OFF_____ 2) ON_____ OFF_____
COND 1) ON_____ OFF_____ 2) ON_____ OFF_____
FANS: 1) ON_____ OFF_____ 2) ON_____ OFF_____ 3) ON_____ OFF_____
OTHER: 1) ON_____ OFF_____ 2) ON_____ OFF_____

AUXILIARY FUEL USED: #2 OIL _____ NAT GAS _____ OTHER _____

Bldg No.: 1118

GENERAL ENERGY CONSERVATION OPPORTUNITY CHECKLIST

Bldg Name: EM Barracks Bldg #: P-1118 Contact: ________ Phone #: ________ Surveyed By: ~~RM~~/RF Date: ~~10/93~~

ECO TITLE	ANNEX A	DATE	ANNEX B	DATE	COMMENTS
INSULATION	A1		# B01	✓	Crawl space walls
STORM WINDOWS or DOUBLE GLAZING	A2		# B02	✓	All windows
WEATHER STRIPPING and CAULKING	A3		# B03	✓	All Windows And Doors
INSULATED PANELS	A4		# B04	✓	
VESTIBULES or REVOLVING DOORS	A5		# B05		N/A - Exist, other usage is low.
LOAD DOCK SEALS (Strip Door or Air Cu)	A6		B06		N/A
REDUCTION of GLASS AREA	A7		B07		N/A - See B4
REPLACE KITCHEN LIGHT FIXTURES	A8		# B08		N/A
SHUTDOWN DHW or MOD CTRLS (Non FH)	A9		B09	✓	INSTALL seperate boiler for DHW
REDUCE LIGHTING LEVELS	A10		# B11		N/A
REPLACE INCANDESCENT LIGHTING	A11		# B12		N/A - See B10
USE MORE EFFICIENT LIGHTING SOURCE	A12		# B10	✓	Replace All Incandescent lights
HIGH EFFICIENCY MOTOR REPLACEMENT	A13		B13	✓	Pump motors
NIGHT SETBACK/SETUP THERMOSTATS *	A14		# B14		N/A - See B19
INFRARED HTRS (Motor Rep Shops & Whse)	A15		# B15		N/A
ECONOMIZER CYCLES (Dry Bulb Type)	A16		# B16		N/A
CONTROL HOT WATER CIRC PUMP *	A17		# B17		N/A - Controlled now)
FM RADIO CONTROLS	A18		B18		N/A
RADIATOR CONTROLS	A19		B19	✓	Install Room T-stats & Radiator val
DECENTRALIZE DHW HTRS (POU Htrs) *	A20		B		N/A
HEAT RECLAIM from HOT REFRIG GAS	A21		# B20		N/A
REDUCE AIR FLOW *	A22		# B21		N/A
PREVENT AIR STRATIFICATION *	A23		# B22		N/A
INSTALL TIME CLOCKS	A24		B23		N/A - DHW Pump needed 24hrs/d
CHILLER REPLACEMENT	A25		B		N/A
REPLACE ABSORPTION CHILLER	A26		B38		N/A
INSULATE STEAM LINES	A27		B26		N/A
RETURN CONDENSATE	A28		B27		N/A
TRANSFORMER OVERVOLTAGE	A29		B31		N/A
TRANSFORMER LOADING	A30		B30		N/A
REVISE OR REPAIR HVAC CONTROLS	A31		B32	✓	Repair OA Controls
WASTE HEAT RECOVERY *	A32		B33		N/A
ADD ADDITIONAL LIGHT SWITCHES	A33		B35		N/A
HVAC INIT/BLDGS WITH SEPARATE BOILERS	A34		# B37	✓	Replace boilers
STANDARD SOLUTIONS for EXT LIGHTS	A35		# B36	✓	install P.E. switches.
BOILER OXYGEN TRIM CONTROLS	A		B24		N/A
REVISE BOILER CONTROLS	A		B25		N/A
PRE-HEAT DHW	A		B28		N/A
HEAT PUMPS	A		# B29		N/A
EMCS	A		B39	✓	
HOT WATER RECIRC PUMPS	A		M40,17		
HPS STREET LIGHTS	A		M41		
ELECTRIC OUTLET INSULATION	A		M42		

<*> Denotes ECO's studied by Burns & McDonnel
<#> Denotes ECO's common to Military Family Housing

Page 8 of 8

JOB Ft CARSON EEAP UPDATE

SHEET NO. 1 OF 1

E M C ENGINEERS, INC.

Denver • Colorado Springs • Atlanta • Germany

CALCULATED BY AJN DATE 9/92

CHECKED BY DATE

SCALE

P-~~1150~~ 1118

AHU (Multizone)

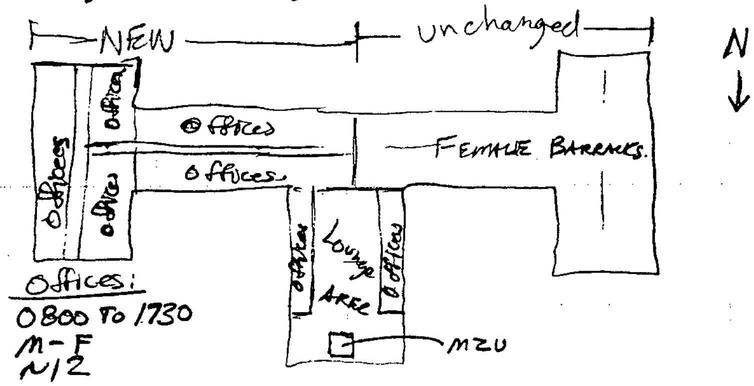
Fan Motor is running; belt is broken so fan inoperable.

No Main Air to HVAC system. Unable to Test Controls.

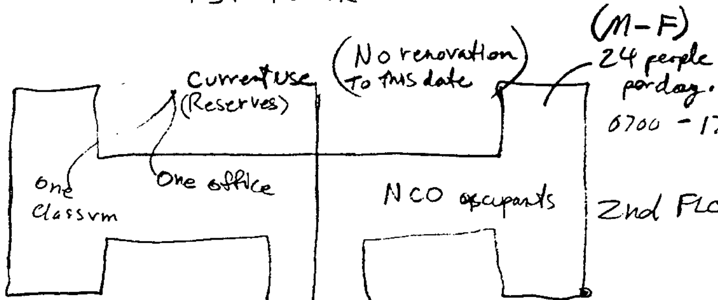
Only one boiler being used

Honeywell Controls (Elect.) operate the 2-way Steam Valves to the 2 converters.

Bldg. is currently under renovation.



1ST FLOOR

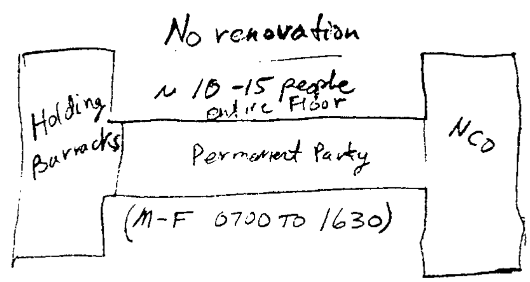


2nd FLOOR

The East Zone water Temp. is Set at 100°F (Honeywell Modutrol 24 V, 20 Watts)
The West Zone " " " " at 105°F (" ")

The East Zone control does not actuate Valve
" West " " does actuate Valve (setting control at 180°F opens Valve).
Both are 2" Control Valves.

No renovation



3rd FLOOR

All new Lighting & Grid Ceiling ~8.5' HT.
Recessed 2'X4' FLUOR. 2 TUBE FIX.
~ 1.5 W/SF for Offices
~ 1.0 W/SF for Hallways.

**** FMEA SIMILAR BUILDINGS SURVEY FORM ****

_RAL BUILDING DATA

Combined Learning Center DISCOM
Building is currently under renovation.
Converting Bldg to Office/Classrooms.

9/92 AJN

BLDG #: 1217(P) BLDG NAME: ~~BARRACKS~~ DATE: ~~2 15 85~~ JOB #: 124
SURVEYED BY: ~~AK/AF~~ BLDG CONTACT: TYLER TELEPHONE EXT: 2826
BLDG USE: BARRACKS # FLOORS: 3 # PEOPLE: 140 BLDG AREA: 51800 SF

BLDG OCCUPANCY: S M T W Th F S 0001 TO 2400
S M T W Th F S ______ TO ______

T'STAT SETTING: HTG: 78 / — AUTO SETBACK: N / Y: — / —
CLG: 76 / 76
Temperature,Future,inside,Occupied: 65/78 Temp Present: 78
Temperature,Future,inside,Unoccupied: 55/- AirChange/hR: 1.07

ARCHITECTURAL

	AREA	U-value	UA
WALL	21,428	.288	6,171
GLASS	6306	1.176	7416
ROOF	18518	.13	2,407
FLOOR	1,022	.86	879
SUM	69,762	—	16,873

Avg. Floor-Ceiling Height: 8.5' Floor type: SLAB Insulated: Y/N
_ow frame type: Alum Wood Operable sections: Y / N
_ow size: See Below SP DP CURT Infiltration L M H
Entry doors: 8 # OH Doors: Ø % of Area Conditioned: 100

LIGHTING: Type: Flourescent Watts/SF: .57 Util Frac: ____

ELECTRICAL EQUIP: OFFICE KW/Unit: ____ #Units: ___ Util Frac: ____

DHW: TYPE: NG/ELEC/CONV Supply Temp: 172° GAL/Person-Day: ____
FROM STEAM AFUE: 60 %

MECHANICAL

	HEATING	COOLING
Primary System:	2- BOILERS	CHW
Fuel:	GAS FIRED	NAG (CP)
Capacity:	287MBH INPUT (EA)	
est.Peak Del.Effic:	45%	52.12%
Months ON:	8	4
Hours ON:	5808	2952
AHUs Hp:	4.25	4.25
cfm:	16.7 K	16.7 K
Min OA:	100%	100%
Economizer:	NO	NO

MISC:

- 6 MZUs - 2 per FLOOR.
- 1- SZU w/ Dampers @ 2.5 HP / 11,200 CFM – Mess Hall
- 1- SZU w/ Dampers @ 1.75 HP / 5,500 CFM – Mess Hall

Windows — Same as Bldg 1118

JOB FT CARSON EEAP UPDATE

SHEET NO. 1 OF 1

E M C ENGINEERS, INC.

Denver • Colorado Springs • Atlanta • Germany

CALCULATED BY AJN DATE 9/92

CHECKED BY ______ DATE ______

SCALE ______

P-1217

Multizone AHUs

1ST. East MER (MZU-2)
5 HP; 200V at 16.6A

1ST. WEST MER (MZU-1)
(Same)

1ST East MER

MZU-2 (3 zones)
4 actuators on mixing dampers.

113 act. for Mixing Dampers

2nd East MER

MZU-4
7.5HP; 200V at 25.4Amp.
3 Actuators for Mixing Dampers.

2nd West ok

3rd East ok

3rd West OK

CW Pump

MER 1ST East
7.5 HP; 200V at 25.4A
24 gpm at 42ft Head

Typical
(2-Way STM Valve is 1 1/4" (Pneu)
2-Way CW " " 1 1/2" (Pneu))

Typical
Mixed Air Set pt. at 60°F.
Hot Deck set at 75°F
Cold deck set at 50°F

1ST WEST MER
MZU-1 (3 zones)
3 actuators on mixing dampers.

MER BSMT

Main BLR is #1
Rite BLR. (Same as other Bldg)
other BLR is orig. Kewanee.

Auto control on all pumps removed?)

COND. PUMPS

2 at 3/4 HP (1ST. East)
230V at 5.2 Amp.
(1ST West)
-Same

General Notes:

1ST FLOOR:
EMT School

2nd Floor: (East Half)
NBC School (Temp. Occupu
Nuclear Biological, & Chemical Warfare.
6:30 TO 6:00pm (M-F) 2 wks ON
20 TO 40 people 2 wks OFF

7:00 - 4:30pm (M-F)
4 people.

Entire Bldg.
7:30 - 5:30
2 people per office

Similiar construction at P-1117

MSG. Hyde
Ext. 2112 or 2735

DEH - ELMO; Pat Miller

Ext. 3513
2491

**** FMEA SIMILAR BUILDINGS SURVEY FORM ****

9/92 AJN

.RAL BUILDING DATA

BLDG #: 1218(P) BLDG NAME: ~~BARRACKS~~ Abandoned DATE: ~~2-15-85~~ JOB #: 124
SURVEYED BY: ~~PK/RT~~ BLDG CONTACT: JACOBSON TELEPHONE EXT: 5283
BLDG USE: BARRACKS # FLOORS: 3 # PEOPLE: 160 BLDG AREA: 51800 SF

BLDG OCCUPANCY: S M T W Th F S 0001 TO 2400
S M T W Th F S ____ TO ____

T'STAT SETTING: HTG: 80/ — AUTO SETBACK: N / Y: — / —
CLG: 76 / 76
Temperature,Future,inside,Occupied: 65/78 Temp Present: 80°
Temperature,Future,inside,Unoccupied: 55 AirChange/hR: 1.07

ARCHITECTURAL

	AREA	U-value	UA
WALL	21,428	.288	6,171
GLASS	6306	1.176	7416
ROOF	18,518	.13	2,407
FLOOR	1,022	.86	879
SUM	69,762	—	16,873

Avg. Floor-Ceiling Height: 8.5' Floor type: SLAB Insulated: Y/N
dow frame type: Alum Wood Operable sections: Y / N
dow size: See Below SP DP CURT Infiltration L M H
Entry doors: 8 # OH Doors: Ø % of Area Conditioned: 100

LIGHTING: Type: Flourescent Watts/SF: .57 Util Frac: ____

ELECTRICAL EQUIP: OFFICE KW/Unit: ____ #Units: ____ Util Frac: ____

DHW: TYPE: NG/ELEC/CONV Supply Temp: ~160 GAL/Person-Day: ____
AFUE: 60 %

MECHANICAL

		HEATING	COOLING
	Primary System:	2-BOILERS	CHW
	Fuel:	GAS FIRED	NAG (CP)
	Capacity:	287MBH INPUT EA	—
	est.Peak Del.Effic:	49%	52.12%
	Months ON:	8	4
	Hours ON:	5808	2952
AHUs	Hp:	4.25	4.25
	cfm:	16.7 K	16.7 K
	Min OA:	100%	100%
	Economizer:	NO	NO

MISC:

1- SZU w/Dampers @ 2.5 HP / 11200 CFM - Mess Hall
1- SZU w/Dampers @ 1.75 HP / 5,500 CFM - Mess Hall
Windows Same as Bldg 1118
6 MZUs - 2 per Floor.

JOB Ft CARSON EEAP UPDATE

SHEET NO. 1 OF 1

E M C ENGINEERS, INC.

Denver • Colorado Springs • Atlanta • Germany

CALCULATED BY AJN DATE 9/92

CHECKED BY ______ DATE ______

SCALE ______

P-1218

Controls are same a 1217

Compressor is broken - No main air.

1st. East MER

2 out of 3 Mixing dampers broken (Linkages disconnected)

Main CW Supply 2-Way Valves Act. are disconnected.
2 - 4" Valves

2nd. Floor East MER

Same as 1st FLOOR., except No O.A. CW control sensor

MZU Syst. Looks OK.

3rd. Floor East MER

MZU Syst. OK

3rd FLOOR West MER

3 act. disconnected on Mixing Dampers - Replace.

2nd Floor West MER

MZU Syst. OK

H&V for Kitchen. controls are shot } Pent House.
AHU " " " " }

1st FLR West MER

MZU Syst. OK.

BSMT MER

Boilers are orig. Kewanee's. They are turned off.

HW circ. pumps & controls as same. Syst. Looks OK.

**** FMEA SIMILAR BUILDINGS SURVEY FORM ****

9/92 AJN

GENERAL BUILDING DATA

BLDG #: 1219(P) BLDG NAME: Noncommissioned Officer Academy & Classrooms ~~BARRACKS~~ DATE: ~~2-15-85~~ JOB #: 124
SURVEYED BY: PK/RT BLDG CONTACT: 1SGT PACHECO TELEPHONE EXT: 4261
BLDG USE: BARRACKS # FLOORS: 3 # PEOPLE: 160 BLDG AREA: 51800 SF

BLDG OCCUPANCY: S M T W Th F S 0001 TO 2400
S M T W Th F S ____ TO ____

T'STAT SETTING: HTG: 80 / — AUTO SETBACK: N / Y: — / —
CLG: ___ / ___
Temperature,Future,inside,Occupied: 65/78 Temp Present: 80°
Temperature,Future,inside,Unoccupied: 55/- AirChange/hR: L07

ARCHITECTURAL

	AREA	U-value	UA
WALL	21,428	.288	6171
GLASS	6306	1.176	7416
ROOF	18,518	.13	2600
FLOOR	1,022	.86	879
SUM	69,762	—	16,873

Avg. Floor-Ceiling Height: 8.5' Floor type: SLAB Insulated: Y/N
Window frame type: Alum Wood Operable sections: Y / N
Window size: See Below SP DP CURT Infiltration L M H
Entry doors: 8 # OH Doors: Ø % of Area Conditioned: 100

LIGHTING: Type: Flourescent Watts/SF: .57 Util Frac: ____

ELECTRICAL EQUIP: OFFICE KW/Unit: ____ #Units: ____ Util Frac: ____

DHW: TYPE: NG/ELEC/CONV Supply Temp: ~150 GAL/Person-Day: ____
AFUE: 60 %

MECHANICAL

	HEATING	COOLING
Primary System:	2-BOILERS	NONE
Fuel:	GAS FIRED	
Capacity:	287MBH INPUT (EA)	
est.Peak Del.Effic:	49%	
Months ON:	8	
Hours ON:	5808	
AHUs Hp:	4.25	
cfm:	16700	
Min OA:	100	
Economizer:	NO	

MISC:

2-H&V's supply heated outside air to mess hall area only

Windows Same as Bldg 1118 West Zone setpt. - 105°F Cond. pumps: 2 at 1/2 HP @
East " " - 105°F

HW pumps: 2 at 2HP @ 2-2-Way STM Valves (2") Honeywell Modutrol actuators 24Volt.

JOB FT CARSON EEAP UPDATE

SHEET NO. 1 OF 1

E M C ENGINEERS, INC.

Denver • Colorado Springs • Atlanta • Germany

CALCULATED BY AJN DATE 9/93

CHECKED BY DATE

SCALE

P-1219

1st Sgt. Shumcheon. Ext. 2373 Ext. 2509

30 day courses.

270 students & staff at One Time

0630 Am - 10:00 pm.

Offices on 1st.

2nd & 3rd Classrooms

Baseboard Radiation on the perimeter of the Bldg. throughout.

No MZUs in this Bldg.

All new insulation on Boilers & piping.

All ACM has been abated.

Classroom Lighting is:

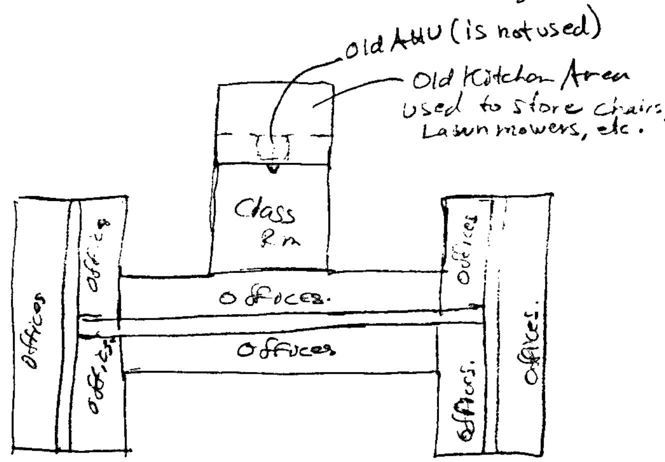
(38' X 26') = SF

2 TUBE 4' FLOOR. at 12 FIXs.

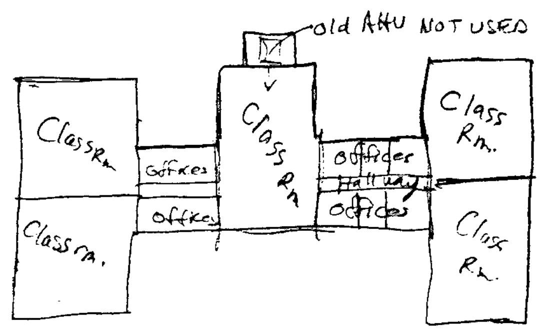
40W LAMPS

= watts/SF for Classrooms.

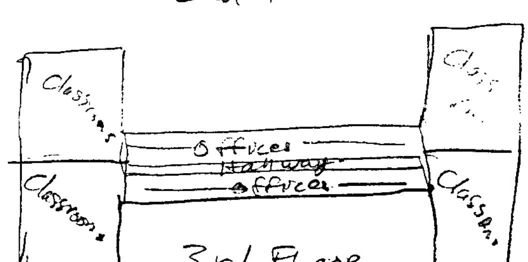
Lighting is recessed in new grid ceiling. (~ 8" air space in ceiling.)



1st FLOOR



2nd FLOOR



3rd FLOOR.

****** FMEA SIMILAR BUILDINGS SURVEY FORM ******

9/92
AJN

...RAL BUILDING DATA

PLDC Primary Leadership Development Classrooms,

BLDG #: 1220(P) BLDG NAME: ~~BARRACKS~~ DATE: ~~2-15-85~~ JOB #: 124
SURVEYED BY: ~~AK/RT~~ BLDG CONTACT: RIPLEY TELEPHONE EXT: 5933
BLDG USE: BARRACKS # FLOORS: 3 # PEOPLE: 160 BLDG AREA: 51800 SF

BLDG OCCUPANCY: S M T W Th F S 0001 TO 2400
S M T W Th F S ____ TO ____

T'STAT SETTING: HTG: 80 / — AUTO SETBACK: N / Y: — / —
CLG: ___ / 76
Temperature,Future,inside,Occupied: 65/78 Temp Present: 80°
Temperature,Future,inside,Unoccupied: 55/- AirChange/hR: 1.07

ARCHITECTURAL

	AREA	U-value	UA
WALL	21,428	.288	6,171
GLASS	6306	1.176	7416
ROOF	18,518	.13	2,407
FLOOR	1,022	.86	879
SUM	69,762	—	16,873

Avg. Floor-Ceiling Height: 8.5' Floor type: SLAB Insulated: Y/N
...dow frame type: Alum / Wood Operable sections: Y / N
...low size: ____ x ____ SP DP CURT Infiltration L M H
...ntry doors: 8 # OH Doors: Ø % of Area Conditioned: 100

LIGHTING: Type: Flourescent Watts/SF: .57 Util Frac: ____

ELECTRICAL EQUIP: OFFICE KW/Unit: ____ #Units: ____ Util Frac: ____

DHW: TYPE: NG/ELEC/CONV Supply Temp: ~160 GAL/Person-Day: ____
AFUE: 60 %

MECHANICAL

		HEATING	COOLING
	Primary System:	2-BOILERS	CHW
	Fuel:	GAS FIRED	NG (CP)
	Capacity:	2871MBH INPUT (EA)	
	est.Peak Del.Effic:	49%	52.1%
	Months ON:	8	4
	Hours ON:	5808	2952
AHUs	Hp:	4.25	4.75
	cfm:	16,700	16,700
	Min OA:	100%	100%
	Economizer:	NO	NO

MISC:

6 - MZUs; 2 per Floor.

JOB FT CARSON EEAP UPDATE

SHEET NO. 1 OF 1

E M C ENGINEERS, INC.

Denver • Colorado Springs • Atlanta • Germany

CALCULATED BY AJN DATE 9/92

CHECKED BY DATE

SCALE

P-1220

MER

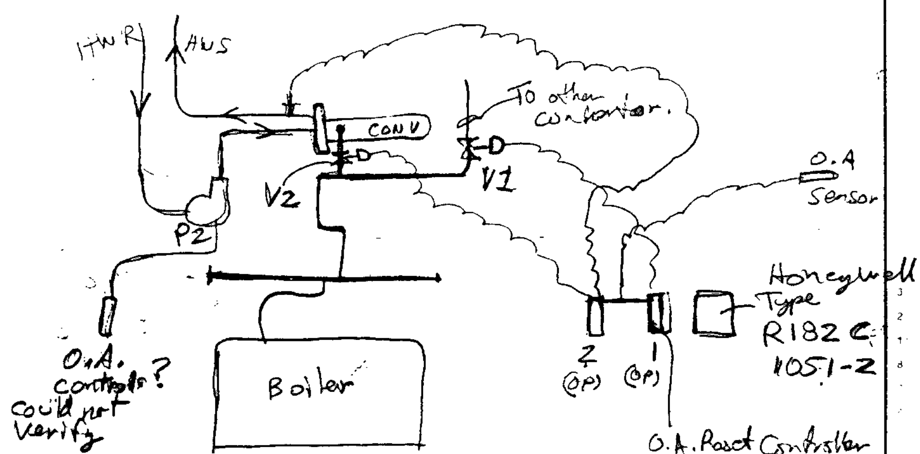
2 steam convertors
- 1 for West Zone
- 1 for East Zone

HW Pump No 1. serves West Zone
" " No. 2. serves East Zone.

HW Pump No. 1 is new:
Bell & Gossett No. 312T
1½ HP Marathon
208-230/460 V.
4.8-4.8/2.4 A.

Pump No. 2 is 1½ HP.
original.

Basis Steam Convertor Configuration



Valve Control 1 set at 105°F
" 2 set at 100°F

All asbestos abated from MER.

Cond-Pumps:
2 at ½ HP ea.
Buldor.

Boilers are original Kewanee's

Bldg. Hallways are 0.5 watts/SF (Floor)

All Three Floors are used as Barracks.
6 MZU's in Bldg. all are Turned OFF.
1st Flr Middle Classroom has new grid ceiling & Floor. Lights.
Bldg. is well Kept up. Most of Bldg. is original survey.
Old Kitchen Mess is locked; is not used for storage.
New DHW Heater heats water to storage tank.

**** FMEA SIMILAR BUILDINGS SURVEY FORM ****

9/92 AJN

..NERAL BUILDING DATA

BLDG #: 1363(P) BLDG NAME: BK W/O MESS DATE: ~~2-13-85~~ JOB #: 124
SURVEYED BY: ______ BLDG CONTACT: ______ TELEPHONE EXT: ______
BLDG USE: BARRACKS # FLOORS: 3.1 # PEOPLE: ___ BLDG AREA: 40639 SF

BLDG OCCUPANCY: S M T W Th F S 0001 TO 2400
S M T W Th F S ______ TO ______

T'STAT SETTING: HTG: 76 / — AUTO SETBACK: N / Y: — / —
CLG: — / —
Temperature, Future, inside, Occupied: 65/- Temp Present: 76
Temperature, Future, inside, Unoccupied: 55/- AirChange/hR: 1.07

ARCHITECTURAL

	AREA	U-value	UA
WALL	16,046	.161	2,583
GLASS	4,414	~~1.176~~ 0.568	5,191
ROOF	13509	.090	1,216
FLOOR	13,509	0.25	3,377
SUM	47,478	—	12,367

Avg. Floor-Ceiling Height: 8' Floor type: Crawl Space Insulated: Y/N
..ndow frame type: Alum Wood Operable sections: Y / N
..ndow size: See Below SR DP CURT Infiltration L M H
Entry doors: ______ # OH Doors: 6 % of Area Conditioned: ______

LIGHTING: Type: Fluorescent Watts/SF: .57 Util Frac: ______

ELECTRICAL EQUIP: KW/Unit: ____ #Units: ____ Util Frac: ______

DHW: TYPE: NG/ELEC/CONV Supply Temp: ~150 GAL/Person-Day: ______
AFUE: 63.1 %

MECHANICAL

		HEATING	COOLING
	Primary System:	HTHW→HW Conv.	NONE
	Fuel:	NaG (CP)	
	Capacity:	1905 KBTUH	
	est.Peak Del.Effic:	63.1%	
	Months ON:	8	
	Hours ON:	5808	
AHUs	Hp:	15	
	cfm:	~190 KCFM	
	Min OA:	100%	
	Economizer:	NO	

MISC:

- 1-CONVERTOR-190SMBH
- 2-EF'S @7.5 HP/19.3 KCFM ea
- Windows: 284-42" X53" ; 2-32"X53"

6 - 150 watt exterior lamps on 12 hrs/day (avg)

E M C ENGINEERS, INC.

JOB FT CARSON EEAP UPDATE

SHEET NO. 1 OF 1

CALCULATED BY AJN DATE 9/92

CHECKED BY DATE

SCALE

BLDG. P-1363

HW RADIATION ZONE PUMPS

PUMP #1 : 1 HP BALDOR MOTOR
PUMP #2 : NEW B&G pump - 2HP MARATHON MOTOR

2 RADIATION ZONES

ZN 1 HTG VALVE IS 2" PNEUMATIC.
ZN2 " " " " "

HTHW CONTROL VALVE IS A 1 1/2" PNEUMATIC

CW PUMP HAS O.A. RESET
• SETPTS AT 80°F & 55°F.

AHU (NORTHEND)

- 15 HP MOTOR
- SMART ECONOMIZER - SET PT. AT 70°F
- FAN MOTOR CUT OUT SETPT. AT 70°F.
  - WHEN ABOVE 70°F, FAN WILL RUN.
- ALL DAMPER ACTUATORS ARE HONEYWELL MODUTROL ACTUATORS.
- NO MIXED AIR CONTROL SETPT.
  - EITHER ALL O.A. OR R.A. DEPENDS ON SMART ECONOMIZER.
- CW COIL VALVE IS A TWO-WAY, SIZE IS 2". RESETS FROM DISCHARGE AIR TEMP. & O.A. TEMP.

ARCHITECTURAL CHANGES

BLDG. HAS DOUBLE PANE WINDOWS, ALUM. VERTICAL SLIDERS.

**** FMEA SIMILAR BUILDINGS SURVEY FORM ****

9/92 AJN

:RAL BUILDING DATA

BLDG #: 1364 (P) BLDG NAME: BK W/O MESS DATE: ~~2-13-85~~ JOB #: 124
SURVEYED BY: ____ BLDG CONTACT: ____ TELEPHONE EXT: ____
BLDG USE: BARRACKS # FLOORS: 3.1 # PEOPLE: ____ BLDG AREA: 40639 SF

BLDG OCCUPANCY: S M T W Th F S 0001 TO 2400
S M T W Th F S ____ TO ____

T'STAT SETTING: HTG: 76 / — AUTO SETBACK: N / Y: — / —
CLG: — / —
Temperature,Future,inside,Occupied: 65/- Temp Present: 76
Temperature,Future,inside,Unoccupied: 55/- AirChange/hR: 1.07

ARCHITECTURAL

	AREA	U-value	UA
WALL	16,046	.161	2,583
GLASS	4,414	~~1.176~~ 0.568	5,191
ROOF	13509	.090	1216
FLOOR	13,509	0.25	3,377
SUM	34,689	—	12,367

Avg. Floor-Ceiling Height: 8' Floor type: Crawl Space Insulated: Y/N
''ndow frame type: Alum Wood Operable sections: Y / N
dow size: See Below SP DP CURT Infiltration L M H
entry doors: ____ # OH Doors: 0 % of Area Conditioned: ____

LIGHTING: Type: Fluorescent Watts/SF: .57 Util Frac: ____

ELECTRICAL EQUIP: KW/Unit: ____ #Units: ____ Util Frac: ____

DHW: TYPE: NG/ELEC/CONV Supply Temp: ~150 GAL/Person-Day: ____
AFUE: 63.1 %

MECHANICAL

	HEATING	COOLING
Primary System:	HTHW→HW Conv.	NONE
Fuel:	NaG (CP)	
Capacity:	1905 KBTUH	
est.Peak Del.Effic:	63.1%	
Months ON:	8	
Hours ON:	5808	
AHUs Hp:	15	
cfm:	~190 KCFM	
Min OA:	100%	
Economizer:	NO	

MISC:

- 1-CONVERTOR-1905MBH
- 2-EF's @ 7.5 HP/19.3 KCFM ea
- 184 Windows - 42" x 53"

6- 150 watt exterior lights, on 12 hrs/day. (avg)

PAGE 1 of 1

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P-1364

JOB FT CARSON EEAP UPDATE
SHEET NO. ______ OF ______
CALCULATED BY AJN. DATE 9/92
CHECKED BY ______ DATE ______
SCALE ______

Exh Fan Rm is under Water ~ 4" deep.

No AHU for cooling.

1 HP pump Motors - 2ea

Same. radiation controls

2" Zone Valves Rad. Pnew.

Marathon Exh. Fan motor
15 HP (North End MER)
(only equip- present)

Windows are Dbl. Pane, Vert. Sliders, Alum.

ACM in MER.

**** FMEA SIMILAR BUILDINGS SURVEY FORM ****

9/92 AJN

ERAL BUILDING DATA

BLDG #: 1365 (P) BLDG NAME: BK W/O MESS DATE: ~~2-13-85~~ JOB #: 124
SURVEYED BY: ______ BLDG CONTACT: ______ TELEPHONE EXT: ______
BLDG USE: BARRACKS # FLOORS: 3.1 # PEOPLE: ______ BLDG AREA: 40639 SF

BLDG OCCUPANCY: S M T W Th F S 0001 TO 2400
S M T W Th F S ______ TO ______

T'STAT SETTING: HTG: 76 / — AUTO SETBACK: N / Y: — / —
CLG: — / —
Temperature,Future,inside,Occupied: 65/- Temp Present: 76
Temperature,Future,inside,Unoccupied: 55/- AirChange/hR: 1.07

ARCHITECTURAL

	AREA	U-value	UA
WALL	16,046	.161	2,583
GLASS	4,414	~~1.176~~ 0.568	5,191
ROOF	13509	.090	1216
FLOOR	13,509	0.25	3,277
SUM	34,689	—	12,367

Avg. Floor-Ceiling Height: 8' Floor type: Crawl Space Insulated: Y/N
dow frame type: Alum Wood Operable sections: Y / N
dow size: See Below SP DP CURT Infiltration L M H
Entry doors: ______ # OH Doors: 6 % of Area Conditioned: ______

LIGHTING: Type: Fluorescent Watts/SF: .57 Util Frac: ______

ELECTRICAL EQUIP: KW/Unit: ______ #Units: ______ Util Frac: ______

DHW: TYPE: NG/ELEC/CONV Supply Temp: ~150 GAL/Person-Day: ______
AFUE: 63.1 %

MECHANICAL

		HEATING	COOLING
	Primary System:	HTHW → HW Conv.	NONE
	Fuel:	NaG (CP)	
	Capacity:	1905 KBTUH	
	est.Peak Del.Effic:	63.1%	
	Months ON:	8	
	Hours ON:	5808	
AHUs	Hp:	15	
	cfm:	~190 KCFM	
	Min OA:	100%	
	Economizer:	NO	

MISC:

- 1-CONVERTOR - 1905 MBH
- 2- EF's @ ~~7.5~~ 15 HP/19.3 KCFM ea
- 184 windows - 42" X 53"
- 2 - 2HP HW Pumps (Marathon motors)
- 6 - 150 watt exterior lamps, on 12 hr/day (avg)
- Johnson Pneumatic Controls

**** FMEA SIMILAR BUILDINGS SURVEY FORM ****

9/92 AJN

ERAL BUILDING DATA

BLDG #: 1366(P) BLDG NAME: BK W/O MESS DATE: ~~2-13-85~~ JOB #: 124
SURVEYED BY: ______ BLDG CONTACT: ______ TELEPHONE EXT: ______
BLDG USE: BARRACKS # FLOORS: 3.1 # PEOPLE: ___ BLDG AREA: 40639 SF

BLDG OCCUPANCY: S M T W Th F S 0001 TO 2400
S M T W Th F S ______ TO ______

T'STAT SETTING: HTG: 76 / — AUTO SETBACK: N / Y: — / —
CLG: — / —
Temperature,Future,inside,Occupied: 65/- Temp Present: 76
Temperature,Future,inside,Unoccupied: 55/- AirChange/hR: 1.07

ARCHITECTURAL

	AREA	U-value	UA
WALL	16,046	.161	2,583
GLASS	4,414	~~1.176~~ 0.568	5,191
ROOF	13,509	.090	1,216
FLOOR	13,509	0.25	3,377
SUM	34,689	—	12,367

Avg. Floor-Ceiling Height: 8' Floor type: Crawl Space Insulated: Y/N
Window frame type: Alum Wood Operable sections: Y / N
Window size: See Below ~~SP~~ DP CURT Infiltration L M H
Entry doors: ______ # OH Doors: 0 % of Area Conditioned: ______

LIGHTING: Type: Fluorescent Watts/SF: .57 Util Frac: ______

ELECTRICAL EQUIP: KW/Unit: ______ #Units: ______ Util Frac: ______

DHW: TYPE: NG/ELEC/CONV Supply Temp: ~150 GAL/Person-Day: ______
AFUE: 63.1 %

MECHANICAL

	HEATING	COOLING
Primary System:	HTHW→HW Conv.	NONE
Fuel:	NaG (CP)	
Capacity:	1905 KBTUH	
est.Peak Del.Effic:	63.1%	
Months ON:	8	
Hours ON:	5808	
AHUs Hp:	15	
cfm:	~190 KCFM	
Min OA:	100%	
Economizer:	NO	

MISC:

- 1-CONVERTOR - 1905 MBH
- 2- EF's @ 7.5 HP / 19.3 KCFM ea (15)
- 184 Windows 42" X 53"
- 2 - HW Pumps; 1 HP Baldor Motors - 1 is High Efficiency
- 6 - 150 watt exterior lamps, on 12 hrs/day (avg)

**** FMEA SIMILAR BUILDINGS SURVEY FORM ****

9/92 AJN

-ERAL BUILDING DATA

BLDG #: 1367(P) BLDG NAME: BK W/O MESS DATE: ~~2-13-85~~ JOB #: 124
SURVEYED BY: ______ BLDG CONTACT: ______ TELEPHONE EXT: ______
BLDG USE: BARRACKS # FLOORS: 3.1 # PEOPLE: ___ BLDG AREA: 40639 SF

BLDG OCCUPANCY: S M T W Th F S 0001 TO 2400
S M T W Th F S ______ TO ______

T'STAT SETTING: HTG: 76 / — AUTO SETBACK: N / Y: — / —
CLG: — / —
Temperature,Future,inside,Occupied: 65/- Temp Present: 76
Temperature,Future,inside,Unoccupied: 55/- AirChange/hR: 1.07

ARCHITECTURAL

	AREA	U-value	UA
WALL	16,046	.161	2,583
GLASS	4,414	~~1.176~~ 0.568	5,191
ROOF	13509	.090	1,216
FLOOR	13,509	0.25	3,377
SUM	34,689	—	12,367

Avg. Floor-Ceiling Height: 8' Floor type: Crawl Space Insulated: Y/N
-dow frame type: Alum Wood Operable sections: Y / N
-dow size: See Below SP DP CURT Infiltration L M H
Entry doors: ______ # OH Doors: 6 % of Area Conditioned: ______

LIGHTING: Type: Fluorescent Watts/SF: .57 Util Frac: ______

ELECTRICAL EQUIP: KW/Unit: ______ #Units: ___ Util Frac: ______

DHW: TYPE: NG/ELEC/CONV Supply Temp: ~150 GAL/Person-Day: ______
AFUE: 63.1 %

MECHANICAL

		HEATING	COOLING
	Primary System:	HTHW→HW Conv.	NONE
	Fuel:	NaG (CP)	
	Capacity:	1905 KBTUH	
	est.Peak Del.Effic:	63.1%	
	Months ON:	8	
	Hours ON:	5808	
AHUs	Hp:	15	
	cfm:	~190 KCFM	
	Min OA:	100%	
	Economizer:	NO	

MISC:

- 1-CONVERTOR · 1905MBH
- 2- EF's @ ~~7.5~~ 15HP HP/ 19.3 KCFM ea
- 184 Windows - 42" X 53"
- 2 HW pumps; 1 at 1 HP, 1 at 1½ HP.
- 6- 150 watt exterior lamps, on 12 hrs/day (avg)
- Johnson Pneumatic Controls

PAGE 1 of 1

**** FMEA SIMILAR BUILDINGS SURVEY FORM ****

9/92
AJN

-RAL BUILDING DATA

BLDG #: 1664(P) BLDG NAME: BK W/O MESS DATE: ~~2-13-85~~ JOB #: 124
SURVEYED BY: ____ BLDG CONTACT: ____ TELEPHONE EXT: ____
BLDG USE: BARRACKS # FLOORS: 3.1 # PEOPLE: ____ BLDG AREA: 40639 SF

BLDG OCCUPANCY: S M T W Th F S 0001 TO 2400
S M T W Th F S ____ TO ____

T'STAT SETTING: HTG: 76 / — AUTO SETBACK: N / Y: — / —
CLG: — / —
Temperature,Future,inside,Occupied: 65/- Temp Present: 76
Temperature,Future,inside,Unoccupied: 55/- AirChange/hR: 1.07

ARCHITECTURAL

	AREA	U-value	UA
WALL	16,046	.161	2,583
GLASS	4,414	1.176	5,191
ROOF	13509.	.090	1216
FLOOR	13,509	0.25	3,377
SUM	34,689	—	12,362

Avg. Floor-Ceiling Height: 8' Floor type: Crawl Space Insulated: Y/N
-dow frame type: Alum Wood Operable sections: Y / N
-dow size: See Below SP DP CURT Infiltration L M H
-ntry doors: ____ # OH Doors: 0 % of Area Conditioned: ____

LIGHTING: Type: Fluorescent Watts/SF: .57 Util Frac: ____

ELECTRICAL EQUIP: KW/Unit: ____ #Units: ____ Util Frac: ____

DHW: TYPE: NG/ELEC/CONV Supply Temp: ~150 GAL/Person-Day: ____
AFUE: 63.1 %

MECHANICAL

		HEATING	COOLING
	Primary System:	HTHW → HW Conv.	NONE
	Fuel:	NaG (CP)	
	Capacity:	1905 KBTUH	
	est.Peak Del.Effic:	63.1%	
	Months ON:	8	
	Hours ON:	5808	
AHUs	Hp:	15	
	cfm:	~190 KCFM	
	Min OA:	100%	
	Economizer:	NO	

MISC:

- 1-CONVERTOR / ~~1905~~ 15.0 MBH
- 2- EF's @ ~~7.5~~ HP/19.3 KCFM ea
- 184 Windows 42" X 53" (original windows)

6 - 150 watt exterior lamps, on 12 hrs/day (avg)
2 HW Pumps - 1 HP ea. Pneumatic Controls

PAGE 1 of 1

**** FMEA SIMILAR BUILDINGS SURVEY FORM ****

9/92 AJN

.AL BUILDING DATA

BLDG #: 1665 (P) BLDG NAME: BKS W/O MESS DATE: ~~2-13-85~~ JOB #: 124
SURVEYED BY: RT BLDG CONTACT: ______ TELEPHONE EXT: ______
BLDG USE: BARRACKS # FLOORS: 3.1 # PEOPLE: ___ BLDG AREA: 40639 SF

BLDG OCCUPANCY: S M T W Th F S 0001 TO 2400
S M T W Th F S ______ TO ______

T'STAT SETTING: HTG: 72 / — AUTO SETBACK: N / Y: ___ / ___
CLG: 75 / —
Temperature,Future,inside,Occupied: 65/- Temp Present: 76
Temperature,Future,inside,Unoccupied: 55/- AirChange/hR: 1.07

ARCHITECTURAL

	AREA	U-value	UA
WALL	16,046	.161	2,583
GLASS	4,414	1.176	5,191
ROOF	13,509	.090	1,216
FLOOR	13,509	0.25	3,377
SUM	34,689	—	12,367

Avg. Floor-Ceiling Height: 8' Floor type: Crawl Space Insulated: Y/N
Window frame type: Alum Wood Operable sections: Y / N
Window size: See Below SP DP CURT Infiltration L M H
Entry doors: 8 # OH Doors: Ø % of Area Conditioned: 100

LIGHTING: Type: Fluorescent Watts/SF: .57 Util Frac: ___

ELECTRICAL EQUIP: OFFICE KW/Unit: ___ #Units: ___ Util Frac: ___

DHW: TYPE: ELEC/CONV Supply Temp: 140° GAL/Person-Day: ___
AFUE: 63.1 %

MECHANICAL

	HEATING	COOLING
Primary System:	HTHW → HW Conv.	CHW
Fuel:	NaG (CP)	NaG (CP)
Capacity:	2350 KBTUH	
est.Peak Del.Effic:	63.1%	52.12%
Months ON:	8	4
Hours ON:	5808	2952
AHUs Hp:	—	30
cfm:	—	77400
Min OA:	—	30%
Economizer:	—	—

MISC:

- 1-CONVERTOR 2350MBH

184 Windows - 42" x 53" (original windows)

6 - 150 watt lamps on 12 hrs/day (avg) (exterior)

2 HW Pumps - 1 HP High Efficiency Motors ea.

PAGE 1 of 1

**** FMEA SIMILAR BUILDINGS SURVEY FORM ****

9/92
AJN

GENERAL BUILDING DATA

BLDG #: 1666(P) BLDG NAME: BKS W/O MESS DATE: ~~2-13-85~~ JOB #: 124
SURVEYED BY: ~~RT~~ BLDG CONTACT: ______ TELEPHONE EXT: ______
BLDG USE: BARRACKS # FLOORS: 3.1 # PEOPLE: ___ BLDG AREA: 40639 SF

BLDG OCCUPANCY: [S M T W Th F S] 0001 TO 2400
S M T W Th F S ______ TO ______

T'STAT SETTING: HTG: 72 / __ AUTO SETBACK: (N) / Y: __ / __
CLG: 75 / __
Temperature,Future,inside,Occupied: 65/- Temp Present: 76
Temperature,Future,inside,Unoccupied: 55/- AirChange/hR: 1.07

ARCHITECTURAL

	AREA	U-value	UA
WALL	16,046	.161	2,583
GLASS	4,414	1.176	5,191
ROOF	13509	.090	1,216
FLOOR	13,509	0.25	3,377
SUM	34,689	—	12,367

Avg. Floor-Ceiling Height: 8' Floor type: Crawl Space Insulated: Y/(N)
Window frame type: [Alum] Wood Operable sections: [Y] / N
Window size: See Below [SP] DP CURT Infiltration L [M] H
Entry doors: 8 # OH Doors: Ø % of Area Conditioned: 100

LIGHTING: Type: Fluorescent Watts/SF: .57 Util Frac: ____

ELECTRICAL EQUIP: OFFICE KW/Unit: ____ #Units: ___ Util Frac: ____

DHW: TYPE: ELEC / (CONV) Supply Temp: 140° GAL/Person-Day: ____
AFUE: 63.1 %

MECHANICAL

		HEATING	COOLING
	Primary System:	HTHW → HW Conv.	CHW
	Fuel:	NaG (CP)	NaG (CP)
	Capacity:	7350 KBTUH	
	est.Peak Del.Effic:	63.1%	52.12%
	Months ON:	8	4
	Hours ON:	5808	2952
AHUs	Hp:	—	30
	cfm:	—	77400
	Min OA:	—	30%
	Economizer:	—	—

MISC:
- 1-CONVERTOR-7350MBH
- 184 Windows 42" x 53"
- 6-150 watt exterior lamps, on 12 hrs/day (avg)

JOB FT CARSON FEAP UPDATE

SHEET NO. OF

E M C ENGINEERS, INC.

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CALCULATED BY AJN DATE 9/92

CHECKED BY DATE

SCALE

P-1666

Same AHU for cooling as surveyed in Bldg 1363
Htg today, unable to check cooling mode controls.
AHU & controls look to be in good condition.

3HP Bell & Gossett pump on CW

15HP Fan Motors - 2 TOT
- 1 AHU on North end
- 1 AHU on South end.

} Cooling Only.

2 zones for baseboard radiation.
- 1 - 2HP HW pump (Marathon)
- 1 - 1HP HW pump (High Eff Baldor Motor)

Johnson Pneumatic Controls
- Same controls as P1364
- Pneumatic Valves activate.

ACM present on piping.

Windows are S.P. (originals)

**** FMEA SIMILAR BUILDINGS SURVEY FORM ****

9/92 AJN

AL BUILDING DATA

BLDG #: 1667(P) BLDG NAME: BKS W/O MESS DATE: ~~2-13-85~~ JOB #: 124
SURVEYED BY: RT BLDG CONTACT: ______ TELEPHONE EXT: ______
BLDG USE: BARRACKS # FLOORS: 3.1 # PEOPLE: ___ BLDG AREA: 40639 SF

BLDG OCCUPANCY: S M T W Th F S 0001 TO 2400
S M T W Th F S ______ TO ______

T'STAT SETTING: HTG: 72 / ___ AUTO SETBACK: N / Y: ___/___
CLG: 75 / ___
Temperature,Future,inside,Occupied: 65/- Temp Present: 76
Temperature,Future,inside,Unoccupied: 55/- AirChange/hR: 1.07

ARCHITECTURAL

	AREA	U-value	UA
WALL	16,046	.161	2,583
GLASS	4,414	1.176	5,191
ROOF	13,509	.090	1,216
FLOOR	13,509	0.25	3,377
SUM	34,689	—	12,367

Avg. Floor-Ceiling Height: 8' Floor type: ___ Insulated: Y/N
W ow frame type: Alum Wood Operable sections: Y / N
w size: See Below SP DP CURT Infiltration L M H
Entry doors: 8 # OH Doors: ∅ % of Area Conditioned: 100

LIGHTING: Type: Fluorescent Watts/SF: .57 Util Frac: ____

ELECTRICAL EQUIP: OFFICE KW/Unit: ____ #Units: ___ Util Frac: ____

DHW: TYPE: ELEC / CONV Supply Temp: 140° GAL/Person-Day: ____
AFUE: 63.1 %

MECHANICAL

		HEATING	COOLING
	Primary System:	HTHW → HW Conv.	CHW
	Fuel:	NaG (CP)	NaG (CP)
	Capacity:	2350 KBTUH	
	est.Peak Del.Effic:	63.1%	52.12%
	Months ON:	8	4
	Hours ON:	5808	2952
AHUs	Hp:	—	30
	cfm:	—	77400
	Min OA:	—	30%
	Economizer:	—	—

MISC:

1-CONVERTOR-2350MBH
134 Windows 42" X 53"
6-150 watt exterior lamps, on 12 hrs/day (avg)

PAGE 1 of 1

E M C ENGINEERS, INC.
Denver • Colorado Springs • Atlanta • Germany

P-1667

JOB

SHEET NO. OF

CALCULATED BY AJN DATE 9/92

CHECKED BY DATE

SCALE

Same as 1666 except:

- 10HP Fan motor on AHU (South MER)
- 5HP CW pump.
- 2HP HW pumps (2)

South MER is filled with steam to the point of zero visibility.

- major steam leak.

Energy Monitoring hardware in South MER; similar to P-1363

Windows are S.P. (originals)

*** FMEA SURVEY OBSERVATIONS ***

9/82
AJN/JOE

GENERAL BUILDING DATA

BLDG #: P-1227 BLDG NAME: Dental Clinic JOB #: 124
SURVEYED BY: ~~RWW/RT~~ DATE: ~~Nov 21 '84~~ BLDG CONTACT: SFC STARCE
CONTACT TELEPHONE NUMBER: X 5617 BLDG USAGE: Dental Care
TOT BLDG AREA: 15,600 SF # OF FLOORS: 1 # OF PEOPLE: 42 + patients

BUILDING OCCUPANCY: ✓

MON - FRI:	0715 TO 1600		FIRST SHIFT:	✓
SATURDAY:	____ TO ____		SECND SHIFT:	____
SUNDAY:	____ TO ____		THIRD SHIFT:	____
HOLIDAYS:	____ TO ____		HOLIDAYS:	____

ENVIRONMENTAL CONDITIONS:

	HEATING SETPOINTS				COOLING SETPOINTS			
	WEEKDAYS		WEEKENDS		WEEKDAYS		WEEKENDS	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
PRESENT T'STAT:	72	72	72	72	72	72	72	72
REQUIRED T'STAT:	68	55	55	55	78	–	–	–

THERMOSTAT LOCATION(S): Honeywell
HUMIDIFICATION REQUIREMENTS (RH): Approx 40% H'STAT LOCATION(S): RA duct

LIGHTING: ✓

	AREA(SF)	LAMP TYPE	#LMPS	W/SF	SCHEDULE	
ZN 2 1)	9,127	4ft 34 watt Fluo.		1.56	ON 0715	OFF 1600
2)		& 100 W Mercury (recessed)			ON	OFF
ZN 1 3)	6,460	4ft 34 watt Fluo		2.02	ON	OFF
4)					ON	OFF

DATA SOURCE: X OBSERVATION ___ASHRAE ___OTHER (est 10% on at night)
SEE ATTACHED SCHEDULE? X Y ___N page 3

ELECTRIC EQUIPMENT: ✓

	AREA(SF)	TYPE	(KW)	W/SF	SCHEDULE	
ZN 1 1)	6,460	Misc dental Equipment,	est	1.0 w/sf	ON 0715	OFF 1600
ZN 2 2)	9,127	typewriters, etc.	est	0.75 w/sf	ON 0715	OFF 1600
3)					ON	OFF
4)					ON	OFF

DATA SOURCE: ___OBSERVATION ___ASHRAE ___OTHER (est 5% on at night)
SEE ATTACHED SCHEDULE? ___Y ___N

INTERNAL MASS: MATERIAL: equipment & partitions ESTIMATED MASS: _ (L, M, H)

INFILTRATION: LOCATION(S): Vestibule (Main entrance) saves much energy by keeping out infiltration. Building is slightly pressurized.

ESTIMATED RATE: _____(L, M, H) or
X AIR CHANGES or
_____CFM/LIN FT CRACK

	ZN1	ZN2
Heated BLDG VOLUME =	51,680	73,011

Assume No infiltration due to pressurization and use of vestibules.

***** FMEA SURVEY OBSERVATIONS *****

GENERAL BUILDING DATA

CONSTRUCTION: ✓

WALLS:	CONSTRUCTION COMPONENT	WIDTH	HEIGHT	NET AREA (SF)	U-VALUE
NE ~~N~~:	Brick and/or concrete, 3½"	143	9	1,028	0.071
SE ~~S~~:	batt ins., Gyp bd	109/88.5	9/5.5	1,298	0.071
SW ~~E~~:	↓	143	9	1,155	0.071
NW ~~W~~:	↓	109/88.5	9/5.5	1,346	0.071

ROOFS:	CONSTRUCTION COMPONENT	WIDTH	HEIGHT	AREA (SF)	U-VALUE
INT. ZN	Blt up roof, 3" Rigid ins,	95	68	6,460	0.09
EXT. ZN	3 in. concrete, air space,	143	20.5	2,931.5	0.09
EXT. ZN	suspended ceiling	143	20.5	2,931.5	0.09
EXT. ZN	↓	68	27	1,836	0.09
EXT. ZN		68	21	1,428	0.09

WINDOWS:	AREA (SF)	TYPE			
NE ~~N~~:	259 (*)	Aluminum frame	SP __	DP ✓	DRAPES ____
SE ~~S~~:	170 (**)	↓	SP __	DP ✓	DRAPES ____
SW ~~E~~:	132 (***)		SP __	DP ✓	DRAPES ____
NW ~~W~~:	122 (****)	↓	SP __	DP ✓	DRAPES ____
HORIZ:	198				

U = 0.568

FLOOR TYPE: ___ SLAB X CRAWL SPACE ___ BASEMENT ___ OTHER*

AREA: 6460 SF (Located under interior zone)

PERIMETER: 504 LF INSULATION? X Y ___ N ___ IN 2"

SPECIAL AREAS: ______

ADDITIONAL NOTES: T' Stats are single setpoint, except one T'stat #3 - 68°F, #4 - 68°F outside North Day - 69 / Night 64 in NW corner - setback. T-stat #2 - 67° in treatment area (too hot) center of bldg. 4 bunsen burners in fabrication lab. The crawl space is heated by the Mechanical Room, therefor assume no floor heat loss.

FILM #: ________ FRAME #: ________

(*), (**), (***), (****) → See page 4 of 12

SKETCHES:

Note: During the survey, all T-stats were set low in an attempt by the occupants to obtain cooling. However, during the survey the fan system was inoperative and we assume that the occupants maintain a 72°F space temperature (for heating and cooling) during the day and a 64°F setback during the night. Also time clock in MER control panel was found to be inoperative (pins are missing).

* Specify in "Additional Notes"

Bldg No.: P-1227

__FMEA_SURVEY_OBSERVATIONS__

GENERAL_BUILDING_DATA

LIGHTING SCHEDULE

AREA: (A)MAIN____________SF (B)MEZZ____________SF
(A) ________X________ (B) ________X________

DATA SOURCE: X DRAWINGS ___SURVEY TOUR

Mark	#lamps	W/Fix	#Fix	Flr #	Comments	
SW	fluo.	76	62		4,712 watts	ZN2 (Ext)
NW (mid)	fluo.	76	31		2,356 watts	ZN2 (Ext)
Center	fluo.	76	172		13,072 watts	ZN1 (Int)
NE	fluo	76	69		5,244 watts	ZN2 (Ext)
NE	Mercury	120	16		1,920 watts (Recessed)	ZN2 (Ext)

(ZN1) (A) TOTAL: 13,072 Watts/ 6460 SF= 2.02 W/SF

(ZN2) (B) TOTAL: 14,232 Watts/ 9127 SF= 1.56 W/SF

ADDITIONAL NOTES:

Bldg No.: P-1227

GENERAL BUILDING DATA

MISCELLANEOUS BASE LOADS:
DOMESTIC HOT WATER:
MANUFACTURER & MODEL 2 - Rheem Fury 2/75 gal.
FUEL SOURCE ✓ NAT GAS ___ ELEC ___ OIL ___ STM GEN ___ OTHER*
SUPPLY TEMPERATURE 148 °F, DISTANCE FROM HEATER 5 FT
INPUT 75K RECOVERY RATE 63.0 G.P.H. OPERATING SCHEDULE constant

EXTERIOR LIGHTING:
TYPE ______ NO ___ SCHEDULE * CONTROL ______
TYPE ______ NO ___ SCHEDULE ______ CONTROL ______
TOTAL KW ______
FUNCTION OF LIGHTS ___ SECURITY ___ PARKING LOT ___ ENTRY
___ OTHER*

ADDITIONAL COMMENTS: DHW is circulated throughout bldg by 3/4 H.P. pump. 24 hrs/day.

* All ext. lights operate on a photocell mounted on the roof.

Individual Transformer # 308: 500 KVA, 3 Phase,
Manufacturer: Standard Transformer Co., Primary & Secondary Voltage:
2700/12470 Y
-277/480

FILM #: ______ FRAME #: ______

ADDITIONAL SKETCHES:

the Transformer Checks out OK -
No overvoltage or overloading.

*

* Specify in "Additional Comments"

Bldg No.: P-1227

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

HEATING PLANT

✓ PLANT DESCRIPTION:

NUMBER OF UNITS: 1

MAKE & MODEL: 1) Burnham Mod. # 4FL.78-45-LB 15 PSI

2) ____

3) ____

EQUIPMENT: ✓ BOILER ___ DIRECT FIRED ___ STEAM CONV

TYPE: ✓ STEAM ___ HW ___ CAST IRON ___ WATER TUBE, FIRE TUBE

FUEL: NAT GAS ✓ ELECTRIC ____ OIL ____ OTHER ____

MULTIPLE UNIT OPERATION SEQUENCE:

SERIES ____ PARALLEL ____

BURNER STAGES: ____

FIRING RATE/FUEL: #1: ____ #2: ____

BURNER TYPE: ✓ POWER: MFR ____ MOD No. ____

BLOWER ___/__/___-___A .33 HP @ ____ CFM

CONTRL ___/__/___-___A

___ ATMOS: MFR ____ MOD No. ____

___ HOT WATER: SUPPLY SIZE ____ TEMPERATURE ____ PRESSURE ____ PSI

RETURN SIZE ____ TEMPERATURE ____ PRESSURE ____ PSI

X STEAM: HEADER SIZE ____ TEMPERATURE ____ PRESSURE 39 PSI

RATED CAPACITY: MAX BTUH IN 724 MBH

MAX BTUH OUT 579 MBH gross output - 17.3 H.P.

597 lbs/hr.

✓ CONTROLS: TYPE McDonald Boiler Controls

CONDITION good

PLANT AUXILIARIES:

PUMPS: HW 1) ___/__/___-___A ____ HP

2) ___/__/___-___A ____ HP

COND 1) ___/__/___-___A ____ HP

2) ___/__/___-___A ____ HP

FANS: 1) ___/__/___-___A ____ HP @ ____ CFM

2) ___/__/___-___A ____ HP @ ____ CFM

3) ___/__/___-___A ____ HP @ ____ CFM

OTHER 1) ___/__/___-___A ____ HP

2) ___/__/___-___A ____ HP

AUX OPERATING SCHEDULES:

PUMPS: HW 1) ON ____ OFF ____ 2) ON ____ OFF ____

COND 1) ON ____ OFF ____ 2) ON ____ OFF ____

FANS: 1) ON ____ OFF ____ 2) ON ____ OFF ____ 3) ON ____ OFF ____

OTHER: 1) ON ____ OFF ____ 2) ON ____ OFF ____

AUXILIARY FUEL USED: #2 OIL ____ NAT GAS ____ OTHER ____

Bldg No.: P-1227

***** FMEA SURVEY OBSERVATIONS *****

MECHANICAL EQUIPMENT DATA

OPERATING SCHEDULE: DATE STARTED 15 Sep
DATE STOPPED 15 May

	MON - FRI	SAT	SUN
* PRESENT OPERATION:	____ TO ____	____ TO ____	____ TO ____
* REQUIRED OPERATION:	____ TO ____	____ TO ____	____ TO ____

OTHER PLANT COMMENTS: Hoffman Steam Traps - one removed near Air handler, one remains in boiler room. Pneumatic lines - .3" H_2O Honeywell flue damper. Culligan Water Softener/Conditioner

FILM #: _______ FRAME #: _______

SKETCH:

* --> Disregard if the item is the same as the GENERAL BUILDING DATA.

Bldg No.: P-1227

__FMEA_SURVEY_OBSERVATIONS__

MECHANICAL_EQUIPMENT_DATA

COOLING PLANT DATA:

DESCRIPTION: ✓
MANUFACTURER: __TRANE__ (DX Compressor) MODEL: _RAUA-5004-RB_____
NUMBER: __1____ TYPE: ___ CENTRIFUGAL ___ ABSORPTION ___ RECIP
ENERGY SOURCE: _X_ELEC ___STM ___HW ___OTHER(specify)____________
COMPRESSOR KW ____________
CAPACITY: TONS ____15______ AGE _1977___

CONDENSER: ___ AIR COOLED ___ WATER COOLED
UNIT OPERATION: ___ PARALLEL ___ SERIES
SYSTEM SERVES AHU No(s): ______________________________

COOLING TOWER DATA:
MANUFACTURER: ______________________ MODEL: ______________________
TYPE: ______________________________ No. of CELLS: _____
BLOWERS: 1) _____/__/_____-____A @_____CFM
2) _____/__/_____-____A @_____CFM
3) _____/__/_____-____A @_____CFM
DISTANCE TO COOLING TOWER FROM CHILLER ________________________

CONTROLS & OPSEQ: ___When OA ≥ 73 refrig valves (thus compressor) will be cycled in sequence by ZONE stat calling for most cooling

CAN A STRAINER CYCLE OR FLAT PLATE HEAT EXCHANGER BE INSTALLED IN THIS CASE? ____

CW TEMPERATURE: SUPPLY ___°F, RETURN ___°F, PIPE SIZE __________IN
CNW TEMPERATURE: SUPPLY ___°F, RETURN ___°F, PIPE SIZE __________IN

PLANT AUXILIARIES:

PUMPS:	CHW 1)	______/__/___Hz	___A	___HP	@____GPM	ON_____	OFF_____
	2)	______/__/___Hz	___A	___HP	@____GPM	ON_____	OFF_____
	CNW 1)	______/__/___Hz	___A	___HP	@____GPM	ON_____	OFF_____
	2)	______/__/___Hz	___A	___HP	@____GPM	ON_____	OFF_____
FANS:							
COOLING TOWER	1)	______/__/___Hz	___A	___HP	@____GPM	ON_____	OFF_____
	2)	______/__/___Hz	___A	___HP	@____GPM	ON_____	OFF_____
CONDENSER	1)	______/__/___Hz	___A	1.5 HP	@____GPM	ON_____	OFF_____
	2)	______/__/___Hz	___A	1.5 HP	@____GPM	ON_____	OFF_____
~~OTHER~~	3)	______/__/___Hz	___A	1.5 HP	@____GPM	ON_____	OFF_____
	4)	______/__/___Hz	___A	1.5 HP	@____GPM	ON_____	OFF_____
	5/6			1.5/1.5			

OPERATING SCHEDULE: DATE STARTED 15 May____________
DATE STOPPED 15 Sep____________

	MON - FRI	SAT	SUN
* PRESENT OPERATION:	_____ TO _____	_____ TO _____	_____ TO _____
* REQUIRED OPERATION:	____ TO _____	_____ TO _____	_____ TO _____

* --> Disregard if the item is the same as the GENERAL BUILDING DATA.

Bldg No.: P-1227

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

OTHER PLANT COMMENTS: Compressor data: 86 RLA

396 LRA

15 tons

FILM #: ______ FRAME #: ______

SKETCH:

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

✓ AIR HANDLING UNITS:
MANUFACTURER Trane Climate Changer MODEL No. ____
AHU NUMBER: 1 AHU TYPE: Multi zone
LOCATION: MER SPACE SERVED: disp.

✓ FAN DATA:
SUPPLY FAN HP: 20 SUPPLY CFM: 19,220 STATIC PRESS: 1.0
RETURN FAN HP: ? RETURN CFM: 15,215 STATIC PRESS: 1.0
EXHAUST FAN HP: ? EXHAUST CFM: 15,215 STATIC PRESS: 0.75
MOTOR STARTER: MNT __ MOM __. SWITCH: P.B. __ H.O.A. __ DISCON __

✓ COILS:
HEATING: HW __ STM X DIRECT FIRED --> NG __ OIL __ ELC __ OTHER __
COOLING: CW __ DX X. FROM CHILLER ____, FROM DX UNIT 1
REHEAT: # OF COILS ___ TYPE ___. RECOOL: # OF COILS ___ TYPE ___
HUMIDITY: STM X SPRAY __ ELC __. HW/CW COIL VALVES: 2 WAY __, 3 WAY __

DAMPERS:
O.A. DAMPER: Y (Y, N), IF YES, FIXED __%, MODULATING 21% TO 79%
R.A. DAMPER: Y (Y, N), IF YES, FIXED __%, MODULATING 21% TO 79%
E.A. DAMPER: Y (Y, N), IF YES, FIXED __%, MODULATING 21% TO 79%
ECONOMIZER: Y (Y, N), IF YES, OA 65 RA __ ENTHALPY __
OA LEAKAGE: 15 % when dampers are closed IF NO, CAN ECONOMIZER BE ADDED ____

FILTER CONDITION: ✓ GOOD ___ FAIR ___ POOR

SYSTEM OPERATION:

	MON - FRI			SAT			SUN		
*PRESENT OPERATION:	0001	TO	2400	0001	TO	2400	0001	TO	2400
*REQUIRED OPERATION:	___	TO	___	___	TO	___	___	TO	___

	HEATING SETPOINTS				COOLING SETPOINTS			
	WEEKDAYS		WEEKENDS		WEEKDAYS		WEEKENDS	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
*PRESENT TEMP:								
*REQUIRED TMP:								

HUMIDIFICATION REQUIREMENTS (RH): ____ HUMIDISTAT LOCATION: ____

SYSTEM SETPOINTS: MIXED AIR 55 °F, HOT DECK ___ °F, COLD DECK ___ °F
TIME CLOCK: ___ (Y, N), IF YES, IS IT OPERATIONAL ___ (Y, N)

CONTROLS: PNEUMATIC ✓, ELECTRIC ____, PNEUMATIC/ELEC ✓

EQUIPMENT CONDITION: EXCELLENT(E), GOOD(G), POOR(P) T'STAT P
H'STAT G COMPR G DAMPERS G LINKAGES G FANS G SHEAVES G
VALVES G ACTUATORS G BELTS G MIXING BOX G
OTHER ___

COMMENTS: Motor Frame 256T, 230V/54A, 460V/27A
when OAT >65°F OA Dampers close to minimum position of 20%.
O.A. Damper Act. is Honeywell Pneu. # MP 904 B 1028 B; RA damper Act. is the same.

Bldg No.: P-1227

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

AIR HANDLING UNITS:
CONTROL STRATEGY: See sequence of operation - control diagram.
6 zones on AHU. Act. for mixing dampers are Honeywell Pnev.-
MP 909 B 1676 2 7714 All appear to be operable.
1" stm pnev. valve. (2-way) on Stm coil

ADDITIONAL AHU/SYSTEM COMMENTS:
A zone reset on mixed air could be added for additional control.
Time clock is inoperable All controls are in day modes as per note
GE services 1-8-90

FILM #: ______ FRAME #: ______

SYSTEM SKETCH:

P-1227

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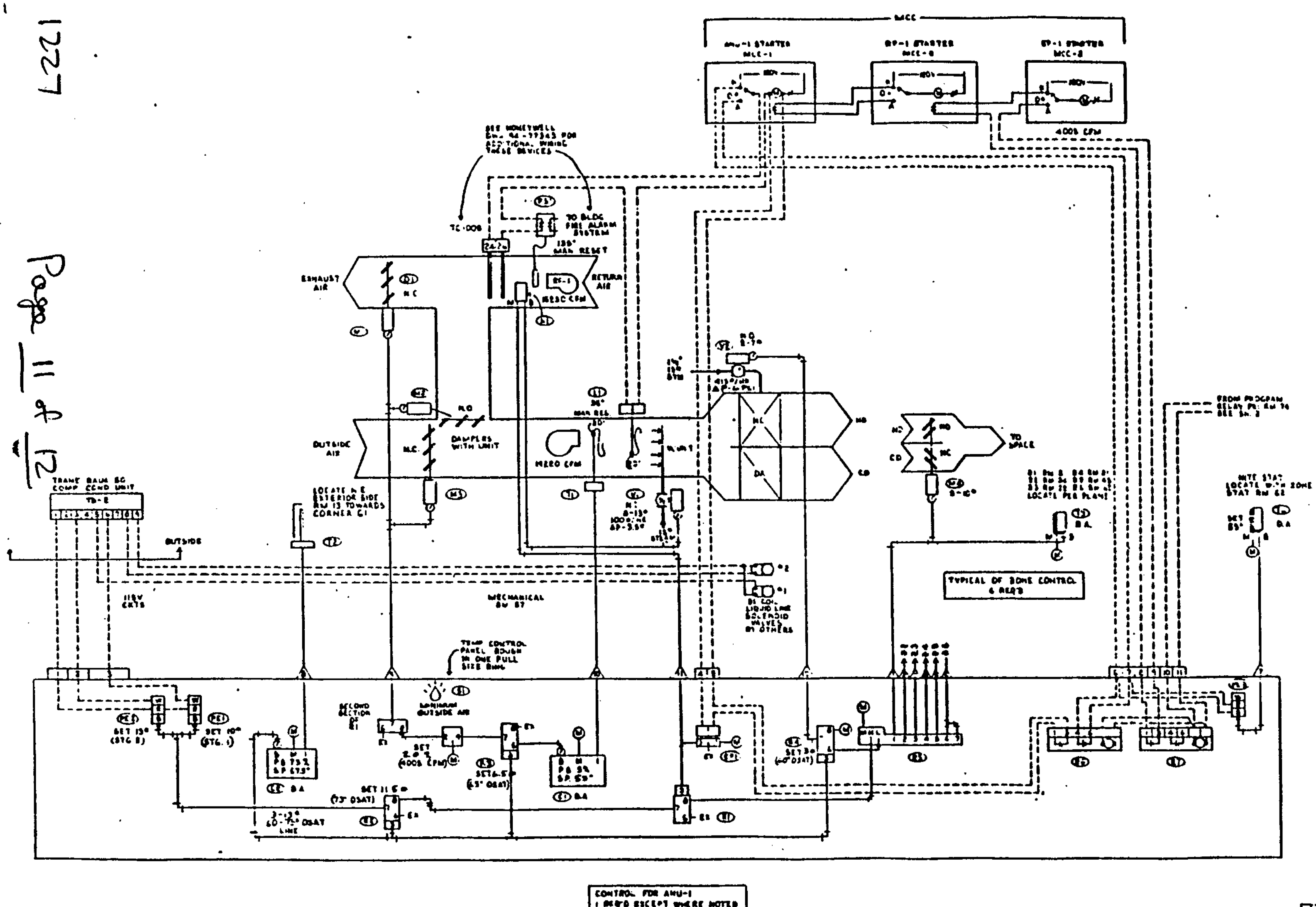

CONTROL FOR AHU-1
1 REQ'D EXCEPT WHERE NOTED

BILL OF MATERIALS

DESCRIPTION
DAMPER WITH ENGINE
PERM. FIRESTAT 100-170°
HUMIDISTAT D.A. 15-75%
DUCT BRACKET
FITTING AIRHEAD
FREEZESTAT 30-60°, MAN. RESET
MOTOR 3-13# ERT
MOTOR 3-13#
MOTOR 5-10 # ERT
TEMP SENSOR 0-100°
TEMP SENSOR -40 TO 160°
BULB SHIELD
THERMOSTAT D.A. 60-80°
COVER, DR. ALUM. S.P. & THERM.
FITTING, AIRHEAD
THERMOSTAT D.A. 40-70°
COVER, DR. ALUM., BLANK
FITTING, AIRHEAD
VALVE, 1/2" CV-2.5
ACTUATOR N.C. 8-13#
VALVE 1" CV-16
ACTUATOR N.O., 3-7#
CAPILLARY CLIPS L1, T1
AIR GAUGE 1 1/2" 0-30#
PANEL, BTMS, FULL SIZE
BULB HOLDER T51

PANEL BILL OF MATERIALS

C1,2	2	RP908A1021	CONTROLLER
EP1	1	RP417B1007	E-P RELAY 120V
PE1,2,3	3	P658A1C12	P-E RELAY
R1	1	RP670A1009	RELAY SPDT
R2,3,4	3	RP471A1002	RELAY SPDT
R5	1	[illegible]	LOAD ANALYZER RELAY
R6,7	2	[illegible]	RELAY DPDT 120V
S1	1	SP970A1005	AIR POS SWITCH

SEQUENCE OF OPERATION

WHEN UNIT FAN IS OFF OR WHEN SYSTEM IS OPERATING DURING SET BACK TIME THE OUTSIDE AND EXHAUST AIR DAMPERS ARE COMPLETELY CLOSED, RETURN AIR DAMPER COMPLETELY OPEN, COMP-COND UNIT IS OFF, EXHAUST FAN EF-1 IS OFF, AND HUMIDIFIER VALVE V1 IS CLOSED.

DURING SET BACK PERIODS (SET BY TIME CLOCK TC1 ON SH 2) NIGHT STAT T6 WILL CYCLE THE SUPPLY AND RETURN AIR FANS TO MAINTAIN 55° SPACE TEMP.

RETURN AIR HUMIDISTAT H1 WILL MODULATE HUMIDIFIER STEAM VALVE V1 TO MAINTAIN RETURN AIR RH AT ITS SETTING.

WHEN OUTSIDE AIR TEMP IS BELOW 60° THE HOT DECK STEAM VALVE V2 WILL BE MODULATED BY THE ZONE STAT CALLING FOR THE MOST HEATING (THRU RS). WHEN OUTSIDE AIR TEMP IS ABOVE 60° V2 IS CLOSED.

WHEN OUTSIDE AIR TEMP IS ABOVE 73° THE COLD DECK REFRIGERANT VALVES WILL BE CYCLED IN SEQUENCE BY THE ZONE STAT CALLING FOR THE MOST COOLING. WHEN OUTSIDE AIR TEMP IS BELOW 73° THE REFRIGERANT VALVES ARE CLOSED.

WHEN OUTSIDE AIR TEMP IS BELOW 63° TO 73°, C1 WILL MODULATE THE OUTSIDE, RETURN, AND EXHAUST AIR DAMPERS TO MAINTAIN MIXED AIR TEMP. WHEN THE OUTSIDE AIR TEMP IS ABOVE 73° THE DAMPERS WILL BE POSITIONED BY C2 ONLY.

ZONE SPACE STATS T3 WILL MODULATE THEIR RESPECTIVE ZONE HOT & COLD DECK DAMPERS TO MAINTAIN SPACE TEMP AT THEIR SETTINGS.

RETURN AIR HIGH TEMP, RETURN AIR SMOKE DETECTOR, AND MIXED AIR FREEZESTAT WILL SHUT DOWN SUPPLY FAN ON EMERGENCY CONDITIONS.

RETURN AIR FAN IS INTERLOCKED TO OPERATE WITH SUPPLY FAN. EXHAUST FAN EF-1 IS INTERLOCKED TO OPERATE WITH RETURN AIR FAN EXCEPT DURING SETBACK TIMES.

CONTRACT CORPS OF ENG
ENGINEER CORPS OF ENG
CONTRACTOR MIAMA CORP P.O. BOX 9876 COLORADO SPRINGS, CO 80932
APPLICATION ENGINEER

HONEYWELL INC
DENTAL CLINIC
WATKEL & PLAINS
FT CARSON, COLORADO
94-77103-1X1

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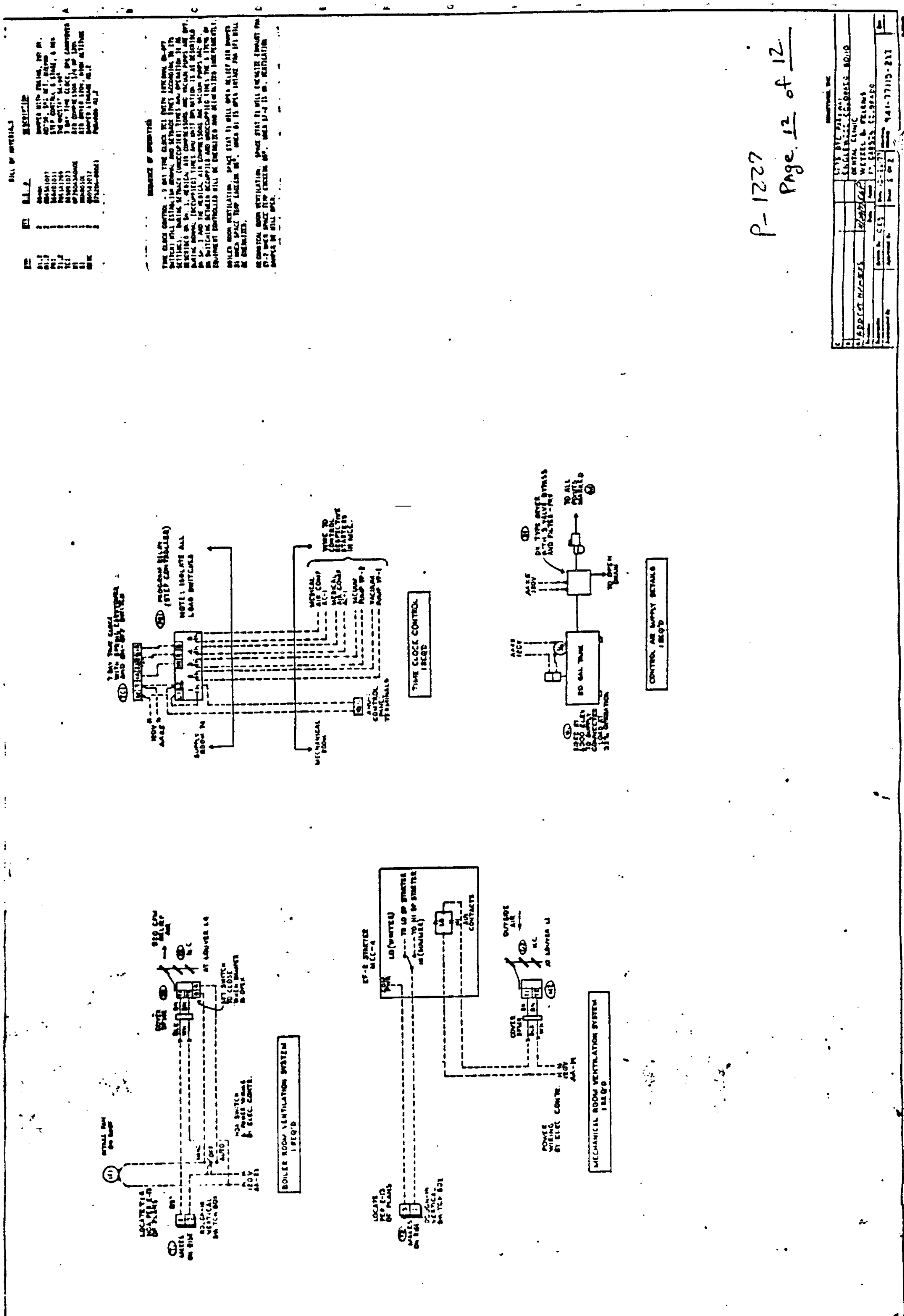

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*** FMEA SURVEY OBSERVATIONS ***

3/25/93/am

GENERAL BUILDING DATA

BLDG #: 1446 BLDG NAME: INDOOR POOL JOB #: 124
SURVEYED BY: DWD DATE: ~~11/20/84~~ BLDG CONTACT: ____
CONTACT TELEPHONE NUMBER: ____ BLDG USAGE: RECREATION
TOT BLDG AREA: 8872 SF # OF FLOORS: 1 # OF PEOPLE: ____

BUILDING OCCUPANCY: ✓

MON - FRI:	0620	TO 1830	FIRST SHIFT:	30 (0620-0830)
SATURDAY:	1015	TO 1900	SECND SHIFT:	20 (1100-1300)
SUNDAY:	—	TO —	THIRD SHIFT:	10-15 (ALL OTHER)
HOLIDAYS:	—	TO —	HOLIDAYS:	____

ENVIRONMENTAL CONDITIONS:

	HEATING SETPOINTS WEEKDAYS DAY	NIGHT	WEEKENDS DAY	NIGHT	COOLING SETPOINTS WEEKDAYS DAY	NIGHT	WEEKENDS DAY	NIGHT
PRESENT T'STAT:	78F	78°F			—	—	—	—
REQUIRED T'STAT:					—	—	—	—

THERMOSTAT LOCATION(S): ____
HUMIDIFICATION REQUIREMENTS (RH): ____ H'STAT LOCATION(S): ____

LIGHTING: ✓

	AREA (SF)	LAMP TYPE	#LMPS	W/SF	SCHEDULE ON	OFF
1)	6260	HPS	10	0.16	0630	1830
2)	2612	INC/FLR	39	0.91	0630	1830
3)						
4)						

DATA SOURCE: ✓ OBSERVATION ___ ASHRAE ___ OTHER
SEE ATTACHED SCHEDULE? ✓ Y ___ N

ELECTRIC EQUIPMENT:

	AREA (SF)	TYPE	(KW)	W/SF	SCHEDULE ON	OFF
1)	2612	WASH/DRY/SAUNA	1.2	0.46	2 HRS	
2)						
3)						
4)						

DATA SOURCE: ✓ OBSERVATION ___ ASHRAE ___ OTHER
SEE ATTACHED SCHEDULE? ___ Y ✓ N

INTERNAL MASS: MATERIAL: WATER ESTIMATED MASS: M (L, M, H)

INFILTRATION: LOCATION(S): ENTRY / LOCKER RM WINDOWS

ESTIMATED RATE: ____ (L, M, H) or
.25 AIR CHANGES or 626 CFM - ZONE 1
____ CFM/LIN FT CRACK 108 CFM - ZONE 2

*** FMEA SURVEY OBSERVATIONS ***

GENERAL BUILDING DATA

CONSTRUCTION:

WALLS:

	CONSTRUCTION COMPONENT	WIDTH	HEIGHT	GROSS AREA (SF)	U-VALUE
N:	4" BRICK / 4" BRICK	62.5/25.5	22/9-6	1617.25	0.578
S:	" "	62.5/25.5	22/9-6	1617.25	0.578
E:	" "	100'-2"	22	2244	0.578
W:	" "	100'-2"	22	2244	0.578

ROOFS:

CONSTRUCTION COMPONENT	WIDTH	HEIGHT	AREA (SF)	U-VALUE
ACOUSTIC TILE / 4" BATT	100'-2"	88'-7"	8872	.077
2" T&G / 15# FELT / AS. SHGL	100'-2"	90'-6"	9064.5	.338

WINDOWS:

	AREA (SF)	TYPE	SF	DP	DRAPES
N:	Ø		–	–	–
S:	Ø		–	–	–
E:	Ø		–	–	–
W:	168	PROJ. MTL FRM	✓	–	N

FLOOR TYPE: ___ SLAB ___ CRAWL SPACE _✓_ BASEMENT ___ OTHER*

AREA: 8872 SF

PERIMETER: 380 LF INSULATION? ___Y _✓_N ___IN ___________

SPECIAL AREAS: ______________________

ADDITIONAL NOTES: ATTIC AREA VENTED BY 2 EACH 2400 CFM EXHAUST FANS ON T-STATS - SET-POINT UNAVAILABLE. SEE DWGS SUPPLIED FOR ADD'L INFO.

FILM #: ________ FRAME #: ______________________

SKETCHES:

* Specify in "Additional Notes"

Bldg No.: 1446

***** FMEA SURVEY OBSERVATIONS *****

GENERAL BUILDING DATA

LIGHTING SCHEDULE

Page ___ of ___

AREA: (A) MAIN 6260 SF POOL (B) MEZZ 2612 SF SH/LOK
(A) ________ X ________ (B) ________ X ________

DATA SOURCE: ___ DRAWINGS ___ SURVEY TOUR

Mark	#lamps	W/Fix	#Fix	Flr #	Comments
HPS	1	100	10	A	POOL AREA LIGHTING
INC	1	60	12	B	WMN LK AREA
INC	1	60	19	B	MEN LK AREA
INC	1	75	3	B	JANITOR
INC	1	60	1	B	ENTRY
FLR	4	34	1	B	ENTRY

(A) TOTAL: 1000 Watts/ 6260 SF = 0.16 W/SF

(B) TOTAL: 2377 Watts/ 2612 SF = 0.91 W/SF

ADDITIONAL NOTES:

POOL CONTAINS (20) - 150 W UNDERWATER LIGHTS (INC.). THESE WERE NOT ADDED IN ABOVE.

*** FMEA SURVEY OBSERVATIONS ***

GENERAL BUILDING DATA

MISCELLANEOUS BASE LOADS:

DOMESTIC HOT WATER:

MANUFACTURER & MODEL ______________________________

FUEL SOURCE ___ NAT GAS ___ ELEC ___ OIL _✓_ STM GEN ___ OTHER*

SUPPLY TEMPERATURE _142_ °F, DISTANCE FROM HEATER _70_ FT

INPUT ______ RECOVERY RATE _______ OPERATING SCHEDULE ___________

EXTERIOR LIGHTING:

TYPE _______________ NO ___ SCHEDULE ___________ CONTROL _________

TYPE _______________ NO ___ SCHEDULE ___________ CONTROL _________

TOTAL KW ___________

FUNCTION OF LIGHTS ___ SECURITY ___ PARKING LOT ___ ENTRY ___ OTHER*

ADDITIONAL COMMENTS: ______________________________

FILM #: ______ FRAME #: ______________________________

ADDITIONAL SKETCHES:

* Specify in "Additional Comments"

Bldg No.: ___________

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

AIR HANDLING UNITS:
MANUFACTURER ______ MODEL No. ______
AHU NUMBER: 1 AHU TYPE: DRAW-THRU
LOCATION: ATTIC SPACE SERVED: POOL/SHOWERS

FAN DATA:
SUPPLY FAN HP: 2 2.5 SUPPLY CFM: 14,400 STATIC PRESS: 0.30
RETURN FAN HP: 2 RETURN CFM: 5,250 STATIC PRESS: 0.375
EXHAUST FAN HP: — EXHAUST CFM: — STATIC PRESS: —
MOTOR STARTER: MNT __ MOM __. SWITCH: P.B. __ H.O.A. ✓ DISCON __
W/T-STAT

COILS: ✓
HEATING: HW __ STM ✓ DIRECT FIRED --> NG __ OIL __ ELC __ OTHER __
COOLING: CW — DX —. FROM CHILLER ——, FROM DX UNIT ——
REHEAT: # OF COILS — TYPE —. RECOOL: # OF COILS — TYPE —
HUMIDITY: STM — SPRAY — ELC —. HW/CW COIL VALVES: 2 WAY __, 3 WAY __

DAMPERS: ✓
O.A. DAMPER: Y (Y, N), IF YES, FIXED __%, MODULATING 35% TO 100%
R.A. DAMPER: Y (Y, N), IF YES, FIXED __%, MODULATING 0% TO 50%
E.A. DAMPER: — (Y, N), IF YES, FIXED —%, MODULATING —% TO —%
ECONOMIZER: N (Y, N), IF YES, OA __ RA __ ENTHALPY __
OA LEAKAGE: 20 % IF NO, CAN ECONOMIZER BE ADDED ______

FILTER CONDITION: ___GOOD ✓ FAIR ___POOR THROW-AWAY

SYSTEM OPERATION:	MON - FRI		SAT		SUN	
*PRESENT OPERATION:	______ TO	______	______ TO	______	______ TO	______
*REQUIRED OPERATION:	______ TO	______	______ TO	______	______ TO	______

	HEATING SETPOINTS				COOLING SETPOINTS			
	WEEKDAYS		WEEKENDS		WEEKDAYS		WEEKENDS	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
*PRESENT TEMP:								
*REQUIRED TMP:								

HUMIDIFICATION REQUIREMENTS (RH): ____ HUMIDISTAT LOCATION: _____

SYSTEM SETPOINTS: MIXED AIR ___°F, HOT DECK ___°F, COLD DECK ___°F
TIME CLOCK: N (Y, N), IF YES, IS IT OPERATIONAL — (Y, N)

CONTROLS: PNEUMATIC ______, ELECTRIC ✓ Barbor-Colman, PNEUMATIC/ELEC ______

EQUIPMENT CONDITION: EXCELLENT(E), GOOD(G), POOR(P) T'STAT ___
H'STAT ___ COMPR ___ DAMPERS ___ LINKAGES ___ FANS ___ SHEAVES ___
VALVES ___ ACTUATORS ___ BELTS ___ MIXING BOX ___
OTHER___

COMMENTS: HEATING COIL CAPACITY = 950 MBH @ 61.5°F RISE, 515 FPM FACE VELOCITY. AHU Fan Belt Loose; Fan not turning. O.A./R.A. damper actuator - Type A; R.A. Sensor set at 84°F.
HTG COIL VALVE & OPR - OK

Bldg No.: 1446

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

EXHAUST FANS:

UNIT NO.	TYPE			CFM	SP	STARTER & CONTROL	SETPOINT
1	ROOF	MEN'S LOCKER		920	.22	AUTO W/AHU	
2	ROOF	MEN'S TOILET		375	.39	AUTO W/AHU	
3	ROOF	WOMEN'S TOILET		460	.35	AUTO W/AHU	
4	ROOF	WOMEN'S LOCKER		700	.20	AUTO W/AHU	
5	SEE AHU-1 DATA SHEET						
6	PROP	ATTIC VENT		2400	.20	AUTO W/STAT	
7	PROP	ATTIC VENT		2400	.20	AUTO W/STAT	

NOTE: ALL FANS EXCEPT № 5 EQUIPPED W/GRAVITY DAMPERS.

• POOL HEATING SYSTEM AT E. WALL LEAKING

FILM #: ________ FRAME #: ________

NOTES: TYPE --> propeller, centrifugal, etc.
STARTER & CONTROL --> momentary, maintained, line v stat, 24 v stat, self contained, etc.

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

HEATING PLANT

PLANT DESCRIPTION: ✓
NUMBER OF UNITS: 2
MAKE & MODEL: 1) KEWANEE M-265-KG
2) KEWANEE M-95-KG
3) —

EQUIPMENT: ✓ BOILER ___ DIRECT FIRED ___ STEAM CONV
TYPE: ✓ STEAM ___ HW ___ CAST IRON ___ WATER TUBE, FIRE TUBE
FUEL: NAT GAS ✓ ELECTRIC _____ OIL _____ OTHER ______

MULTIPLE UNIT OPERATION SEQUENCE:
* SERIES ✓ ______ PARALLEL ______

BURNER STAGES: 1

FIRING RATE/FUEL: #1: 1108→3313 MBH ______ #2: 725→1188 MBH ______

BURNER TYPE: ✓ POWER: MFR KEWANEE ______ MOD No. 1) KEL5-762-G 2) SEE [illegible]
BLOWER 208/3/60-6.6 A 1 1/2 HP @ ______ CFM
CONTRL 110/1/60-1 A
___ ATMOS: MFR ______ MOD No. ______

___ HOT WATER: SUPPLY SIZE ______ TEMPERATURE ______ PRESSURE ____ PSI
RETURN SIZE ______ TEMPERATURE ______ PRESSURE ____ PSI
✓ STEAM: HEADER SIZE 10" TEMPERATURE ______ PRESSURE 10 PSI

RATED CAPACITY: MAX BTUH IN 1) 3313 2) 1188
MAX BTUH OUT 1) 2650 2) 950

CONTROLS: ✓ TYPE HONEYWELL ELECTRIC
CONDITION GOOD TO EXCELLENT

PLANT AUXILIARIES:
PUMPS: HW 1) ____/__/____-____ A ____ 5.0 HP circ. pump.
2) ____/__/____-____ A ______ HP
COND 1) 208/3/60-3.3 A 1/2 HP
2) 208/3/60-3.3 A 1/2 HP New Pumps

FANS: SOLAR 1) 208/3/60-2.4 A 1/2 HP @ ______ CFM
** HEAT 2) 208/3/60-2.4 A 1/2 HP @ ______ CFM
REJECTER 3) 208/3/60-2.4 A 1/2 HP @ ______ CFM

POOL FILTER 1) 208/3/60-29.6 A 10 HP ≈ 250 GPM
** 2) 208/3/60-16 A 5 HP 104 GPM

AUX OPERATING SCHEDULES:
PUMPS: HW 1) ON _____ OFF _____ 2) ON _____ OFF _____
COND 1) ON 2 MIN OFF 40 MIN 2) ON 2 MIN OFF 40 MIN
FANS: 1) ON _____ OFF _____ 2) ON _____ OFF _____ 3) ON _____ OFF _____
OTHER: 1) ON CONT OFF _____ 2) ON _____ OFF _____

AUXILIARY FUEL USED: #2 OIL — NAT GAS — OTHER —

Bldg No.: 1446

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

OPERATING SCHEDULE: DATE STARTED CONTINUOUS
DATE STOPPED ________________

	MON - FRI		SAT		SUN	
* PRESENT OPERATION:	CONT TO _____		_____ TO _____		_____ TO _____	
* REQUIRED OPERATION:	____ TO _____		_____ TO _____		_____ TO _____	

OTHER PLANT COMMENTS: *UNITS MAY BE RUNNINGIN PARALLEL, AS UNIT 1 SHOWS 10 PSI; UNIT 2, 4 PSI. UNIT 2 REMAINED ON WHEN 1 SHUT-DOWN.

UNIT 2 BURNER: KEWANEE KEO.33-600-G

BLOWER: 208/3/60-3.1A 1/2 HP

CONTROLS: 110/3/60-10 A

** SOLAR SYSTEM CIRC PUMP- SYSTEM OFF FOR REPAIRS

Solar System controls OFF - Being repaired 20 May 92

FILM #: _______ FRAME #: ________________________

SKETCH:

* --> Disregard if the item is the same as the GENERAL BUILDING DATA.

Bldg No.: 1446

__FMEA_SURVEY_OBSERVATIONS__

3/26/93
DM

GENERAL_BUILDING_DATA

#: P-1526 BLDG NAME: Admin JOB #: 124
EYED BY: RT/RWW DATE: ~~26 Nov 89~~ BLDG CONTACT: Sandy Christiansen
CONTACT TELEPHONE NUMBER: 579-4592 BLDG USAGE: Community Service
TOT BLDG AREA: 29,850 SF # OF FLOORS: 2 # OF PEOPLE: 75 + 150

BUILDING OCCUPANCY:

MON - FRI:	0730	TO 1615	FIRST SHIFT:	____
SATURDAY:	Closed	TO ____	SECND SHIFT:	____
SUNDAY:	/	TO ____	THIRD SHIFT:	____
HOLIDAYS:	/	TO ____	HOLIDAYS:	____

ENVIRONMENTAL CONDITIONS:

	HEATING SETPOINTS				COOLING SETPOINTS			
	WEEKDAYS		WEEKENDS		WEEKDAYS		WEEKENDS	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
PRESENT T'STAT:	68	68	68	68	—	—	—	—
REQUIRED T'STAT:	68	55	55	55				

THERMOSTAT LOCATION(S): Hallways
HUMIDIFICATION REQUIREMENTS (RH): — H'STAT LOCATION(S): ____

LIGHTING:

	AREA(SF)	LAMP TYPE	#LMPS	W/SF	SCHEDULE	
1)	ZN1 14,925	Fluorescent		0.81	ON 0730	OFF 1615
2)	ZN2 14,925	"		0.86	ON 0730	OFF 1615
3)					ON	OFF
4)					ON	OFF

SOURCE: X OBSERVATION ___ASHRAE ___OTHER (Est 10% on at night)
ATTACHED SCHEDULE? X Y ___N
See page 3 of 11

ELECTRIC EQUIPMENT:

	AREA(SF)	TYPE	(KW)	W/SF	SCHEDULE	
1)		Office Equipment			ON 0730	OFF 1615
2)					ON	OFF
3)		(Est .5 watts/SF)		0.5	ON	OFF
4)					ON	OFF

DATA SOURCE: X OBSERVATION ___ASHRAE ___OTHER (Est 10% on at night)
SEE ATTACHED SCHEDULE? ___Y X N

INTERNAL MASS: MATERIAL: Concrete ESTIMATED MASS: _ (L, M, H)

INFILTRATION: LOCATION(S): windows/doors - During Survey 20% windows open for fresh air - Building is pressurized.

ESTIMATED RATE: _____ (L, M, H) or
_____AIR CHANGES or
_____CFM/LIN FT CRACK

1^{st} Flr volume = 119,400 CF
2^{nd} Flr volume = 119,400 CF

Assume no infiltration due to pressurization and use of vestibules. Air handlers bring in 20% fresh air 24 hrs per day.

ZN 1 : 2,300 cfm = 1.15 AC/HR
ZN 2 : 2,860 cfm = 1.44 AC/HR

FORM8

NET

*** FMEA SURVEY OBSERVATIONS ***

GENERAL BUILDING DATA

CONSTRUCTION:

WALLS:

	CONSTRUCTION COMPONENT	WIDTH	HEIGHT	AREA (SF)	U-VALUE
NE ~~N~~:	4" brick (face), 6" CMU, Rigid	182	14	4616	0.1504
SE ~~S~~:	insulation (1"), gyp brd.	82	14	2,029	0.1504
SW ~~E~~:	↓ ↓	182	14	4,420	0.1504
NW ~~W~~:		82	14	2,029	0.1504

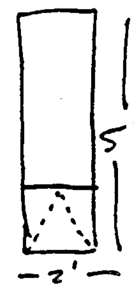
ROOFS:

	CONSTRUCTION COMPONENT	WIDTH	HEIGHT	AREA (SF)	U-VALUE
2N2	Rigid insulation 2 1/2",	182	82	14,925	0.1083
	metal deck, Air space,				
	Accoustic ceiling tile,				
	BU Roofing				

WINDOWS:

	AREA (SF)	TYPE	SP	DP	DRAPES
NE ~~N~~:	480 *	Aluminum frame	X		
SE ~~S~~:	267 **	↓	X		
SW ~~E~~:	676 ***		X		
NW ~~W~~:	267 ****		X		

U=1.18



FLOOR TYPE: ✓ SLAB ___ CRAWL SPACE ___ BASEMENT ___ OTHER*
AREA: 14,925 SF

PERIMETER: 530 LF INSULATION? ✓ Y ___ N 2 IN rigid

SPECIAL AREAS: ______________________

ADDITIONAL NOTES: Many windows are open during the winter due to high internal gains (which tend to over-heat the building). No Air Conditioning is available in the building. Very little air flow in the supply air registers (except when plenum fans operate - summer), therefore very little ventilation is provided. Perimeter baseboard T-stats are set to 68°F (T-stats located in hallways). AHU T-stat set to 68°F (located in central hallway).

FILM #: ________ FRAME #: ________

SKETCHES: Note: No exhaust capability → Bldg is pressurized so very little infiltration.

* 48 windows (2'x5')
** 21 windows (2'x5') + 1 door (glass) (6' x 9.5')
*** 51 windows (2'x5') + 1 door entrance (glass) (17.5' x 9.5')
**** 21 windows (2'x5') + 1 door (glass) (6' x 9.5')

* Specify in "Additional Notes"

Bldg No.: P-1526

FORM_

*** FMEA SURVEY OBSERVATIONS ***

GENERAL BUILDING DATA

HTING SCHEDULE

Page ___of___

AREA: (A) MAIN____________SF (B) MEZZ____________SF
(A) ________X________ (B) ________X________

DATA SOURCE: ___DRAWINGS ___SURVEY TOUR

Mark	#lamps	W/Fix	#Fix	Flr #	Comments
ZN1	318	76	159	1st	½ disconnected (12,084 watts)
ZN2	336	76	168	2nd	½ disconnected (12,768 watts)
					Note: The lamps numbered
					above include only
					those fixtures which
					are currently activated.

(A) TOTAL (ZN 1): 12,084 Watts/ 14,925 SF= 0.81 W/SF
(B) TOTAL (ZN 2): 12,768 Watts/ 14,925 SF= 0.86 W/SF

ADDITIONAL NOTES:
Approximately 50% lights disconnected for energy conservation.

Bldg No.: P-1526

FORM_

*** FMEA SURVEY OBSERVATIONS ***

GENERAL BUILDING DATA

MISCELLANEOUS BASE LOADS:
DOMESTIC HOT WATER:
MANUFACTURER & MODEL Continental - Not used -
FUEL SOURCE ✓ NAT GAS ___ ELEC ___ OIL ___ STM GEN ___ OTHER*
SUPPLY TEMPERATURE _____ °F, DISTANCE FROM HEATER _____ FT
INPUT ______ RECOVERY RATE _______ OPERATING SCHEDULE __________

EXTERIOR LIGHTING:
TYPE ______________ NO ___ SCHEDULE ___________ CONTROL _________
TYPE ______________ NO ___ SCHEDULE ___________ CONTROL _________
TOTAL KW __________
FUNCTION OF LIGHTS ___ SECURITY ___ PARKING LOT ___ ENTRY ___ OTHER*

ADDITIONAL COMMENTS: Individual Transformer #570:
225 KVA, 3 Phase, Manufacturer: Westinghouse
Primary + Secondary Voltage Connect: 7200/12470Y
-277/480
The transformer checks out ok - No
overvoltage or overloading.

FILM #: ______ FRAME #: ______

ADDITIONAL SKETCHES:

* Specify in "Additional Comments"

Bldg No.: P-1526

Page 4 of 10

FORM __

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

HANDLING UNITS:
MANUFACTURER __Tentrol (2 units)__ MODEL No. __DHW 21__
AHU NUMBER: HV 1 & 2 AHU TYPE: __Face & ByPass__
LOCATION: __Penthouse__ SPACE SERVED: __FIRST FLOOR/SECOND FLR__

FAN DATA:
SUPPLY FAN HP: 7.5 SUPPLY CFM: 11,500 (HU 1) 14,300 (HU 2) STATIC PRESS: ___ (each)
RETURN FAN HP: – RETURN CFM: – STATIC PRESS: ___
EXHAUST FAN HP: – EXHAUST CFM: – STATIC PRESS: ___
MOTOR STARTER: MNT __ MOM __. SWITCH: P.B. __ H.O.A. X DISCON __

COILS:
HEATING: HW X STM __ DIRECT FIRED --> NG __ OIL __ ELC __ OTHER __
NONE COOLING: CW __ DX __. FROM CHILLER ________, FROM DX UNIT ______
REHEAT: # OF COILS ___ TYPE _____. RECOOL: # OF COILS ___ TYPE ____
HUMIDITY: STM __ SPRAY __ ELC __. HW/CW COIL VALVES: 2 WAY __, 3 WAY __

DAMPERS:
O.A. DAMPER: Y (Y, N), IF YES, FIXED __%, MODULATING __% TO __%
R.A. DAMPER: Y (Y, N), IF YES, FIXED __%, MODULATING __% TO __%
E.A. DAMPER: N (Y, N), IF YES, FIXED __%, MODULATING __% TO __%
ECONOMIZER: Y (Y, N), IF YES, OA __ RA __ ENTHALPY __
OA LEAKAGE: 20 % IF NO, CAN ECONOMIZER BE ADDED ________

TER CONDITION: ___GOOD ___FAIR X POOR Very Dirty

STEM OPERATION:	MON - FRI	SAT	SUN
*PRESENT OPERATION:	______ TO ______	______ TO ______	______ TO ______
*REQUIRED OPERATION:	______ TO ______	______ TO ______	______ TO ______

	HEATING SETPOINTS				COOLING SETPOINTS			
	WEEKDAYS		WEEKENDS		WEEKDAYS		WEEKENDS	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
*PRESENT TEMP:								
*REQUIRED TMP:								

HUMIDIFICATION REQUIREMENTS (RH): ____ HUMIDISTAT LOCATION: _____

SYSTEM SETPOINTS: MIXED AIR 60 °F, HOT DECK ___ °F, COLD DECK ___ °F
TIME CLOCK: N (Y, N), IF YES, IS IT OPERATIONAL ___ (Y, N)

CONTROLS: PNEUMATIC ______, ELECTRIC X, PNEUMATIC/ELEC ______

EQUIPMENT CONDITION: EXCELLENT(E), GOOD(G), POOR(P) T'STAT P
H'STAT ___ COMPR ___ DAMPERS G LINKAGES G FANS G SHEAVES G
VALVES P ACTUATORS G BELTS G MIXING BOX G
OTHER___

COMMENTS: Motor amperage test: 7.3/7.5/7.1 → 460 Volts (HU 1)

Bldg No.: P-1526

FORM 9

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

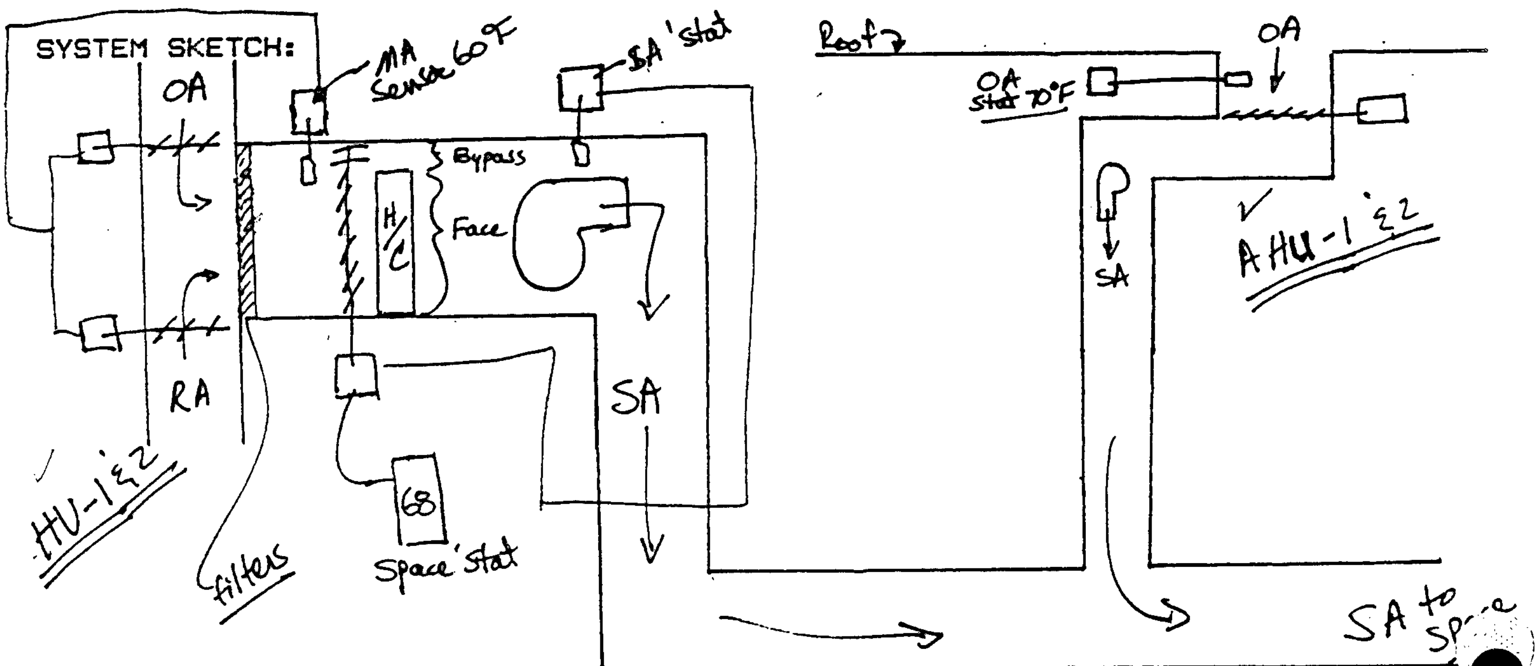
✓AIR HANDLING UNITS:

CONTROL STRATEGY: The system Face and bypass dampers are controlled off of the space thermostat. When heat is required, the bypass dampers close and the Face dampers open. Hot water is continuously supplied to the coil. A temperature drop of 3°F is realized across the HW coil (COILS RUN WILD)

ADDITIONAL AHU/SYSTEM COMMENTS: when the Face dampers are closed, The OA/RA dampers modulate to maintain 60°F MA temp. The MA sensor is located at top of the MA chamber and measures the cold air from the OA intake, this indicates poor mixing in the MA chamber. Fan runs 24 hrs/day with no time clocks. The AHUs are energized when the OA stat reaches 70°F & 100% OA is blown into the SA ductwork. During the survey, warm air migrated up the AHU ductwork and tripped the OA stat. The fan was energized for approx 10 seconds and shut off when cold OA reached the OA sensor.

FILM #: _______ FRAME #: _______

SYSTEM SKETCH:



Bldg No.: P-1526

FORM10

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

UNITARY HEATING EQUIPMENT:

UNIT NO.	TYPE	OUTPUT CAPACITY	HEATING SOURCE	CFM	HP	STARTER & CONTROL	SETPOINT

Baseboard heaters run along the N, E, S, and W facing directions. A single thermostat located in each facing direction hallway controls a valve on the respective loop. 1/12 HP on ea Loop Honeywell Modutrol acts on 3 way diverter Control VLVs. (1") (24 Volt)
6 zones for baseboard heaters ea with a Control Valve. 2 zones come off the MTHW lines that go to the HV units.

FILM #: ________ FRAME #: ________

NOTES: TYPE --> unit heater, unit ventilator, duct furnace, wall furnace, etc.
HEATING SOURCE --> electric, gas fired, oil, steam, hot water, etc.
STARTER & CONTROL --> momentary, maintained, line v stat, 24 v stat, self contained, etc.

Bldg No.: P-1526

FORM 4

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

EXHAUST FANS:

UNIT NO.	TYPE	CFM	HP	STARTER & CONTROL	SETPOINT
~~AHU~~ VU-1	centrifugal serves 1st floor		7.5		55°F O.A cutout
~~AHU~~ VU-2	centrifugal serves 2nd floor		7.5		60°F O.A. cutout

FILM #: ________ FRAME #: ________

NOTES: TYPE --> propeller, centrifugal, etc.
STARTER & CONTROL --> momentary, maintained, line v stat, 24 v stat, self contained, etc.

Bldg No.: P 1526

FORM5

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

HEATING PLANT

✓ PLANT DESCRIPTION:
NUMBER OF UNITS: 1
MAKE & MODEL: 1) Kewanee Boiler Corp. 54 HP - 1800 MBH
2)
3)

EQUIPMENT: ✓ BOILER ___ DIRECT FIRED ___ STEAM CONV
TYPE: ___ STEAM ✓ HW ___ CAST IRON ___ WATER TUBE, FIRE TUBE
FUEL: NAT GAS ✓ ELECTRIC _____ OIL _____ OTHER _____

MULTIPLE UNIT OPERATION SEQUENCE:
SERIES _____ PARALLEL _____

BURNER STAGES: _____

FIRING RATE/FUEL: #1: _____ #2: _____

BURNER TYPE: ✓ POWER: MFR Peabody Gordon-Piatt MOD No. R8-G-05
BLOWER ____/__/___-____A .5 HP @ _____ CFM
CONTRL ____/__/___-____A
___ ATMOS: MFR _____ MOD No. _____

✓ HOT WATER: SUPPLY SIZE _____ TEMPERATURE 158° F PRESSURE 20 PSI
RETURN SIZE _____ TEMPERATURE 140° PRESSURE ____ PSI
__ STEAM: HEADER SIZE _____ TEMPERATURE _____ PRESSURE ____ PSI

RATED CAPACITY: MAX BTUH IN 700 K - 2240 K
MAX BTUH OUT _____

CONTROLS: TYPE _____
CONDITION _____

PLANT AUXILIARIES:
PUMPS: HW 1) ____/__/____-2.8 A .75 HP HVU-1
2) ____/__/____-____A ~~1.50~~ 0.75 HP HVU-2
3) ____/__/____-____A 1/6 HP NW 1ST FLR BSBD
4) ____/__/____-____A 1/12 HP NE 1ST FLR BSBD

5) ____/__/____-____A 1/12 HP @ ~~_____ CFM~~ SW 1ST FLR BSBD
6) ____/__/____-____A 1/6 HP @ ~~_____ CFM~~ SE 2ND FLR BSBD
) ____/__/____-____A _____ HP @ ~~_____ CFM~~

OTHER 1) ____/__/____-____A _____ HP
2) ____/__/____-____A _____ HP

AUX OPERATING SCHEDULES:
PUMPS: HW 1) ON _____ OFF _____ 2) ON _____ OFF _____
COND 1) ON _____ OFF _____ 2) ON _____ OFF _____
FANS: 1) ON _____ OFF _____ 2) ON _____ OFF _____ 3) ON _____ OFF _____
OTHER: 1) ON _____ OFF _____ 2) ON _____ OFF _____

AUXILIARY FUEL USED: #2 OIL _____ NAT GAS _____ OTHER _____

Bldg No.: P-1526

FORM 11

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

OPERATING SCHEDULE: DATE STARTED ________________
DATE STOPPED ________________

	MON - FRI	SAT	SUN
* PRESENT OPERATION:	_____ TO _____	_____ TO _____	_____ TO _____
* REQUIRED OPERATION:	_____ TO _____	_____ TO _____	_____ TO _____

OTHER PLANT COMMENTS: Rating - 1800 MBH / 54 H.P.
294 S.F. Heating Surface
Honeywell Hot Water Valves 3 zones up / 3 zones down

SW & NW 2ND FLR Baseboard are fed by HUU-1 and
HUU-2 pumps respectively.

FILM #: _______ FRAME #: ________________

SKETCH:

- 4 - 3WAY BB ZONE VALVES (REPL), OPERATORS (?)
  3 @ 1"
  1 @ 2"
  1 @ 1 1/4
- 1 PUMP FLANGE LEAKING

* --> Disregard if the item is the same as the GENERAL BUILDING DATA.

Bldg No.: P-1526

FORM 6

***** FMEA SURVEY OBSERVATIONS *****

9/92
AJN/JOE

GENERAL BUILDING DATA

BLDG #: 1528 BLDG NAME: MAIN POST LIBRARY JOB #: 124
SURVEYED BY: TEAM 1 DATE: ~~11/8/84~~ BLDG CONTACT: MR MILLER
CONTACT TELEPHONE NUMBER: 2350/2842 BLDG USAGE: OFFICES/LIBRARY
TOT BLDG AREA: 27,300 SF # OF FLOORS: 1 # OF PEOPLE: SEE ATTACHED SCHEDULE

*BUILDING OCCUPANCY: MON - ~~FRI~~ THU: 0700 TO 2100 FIRST SHIFT: _____
FRIDAY ~~SATURDAY~~: 0700 TO 1800 SECND SHIFT: _____
SATURDAY ~~SUNDAY~~: 0700 TO 1700 THIRD SHIFT: _____
SUNDAYS & HOLIDAYS: CLOSED HOLIDAYS: _____

ENVIRONMENTAL CONDITIONS:

	HEATING SETPOINTS				** COOLING SETPOINTS			
	WEEKDAYS		WEEKENDS		WEEKDAYS		WEEKENDS	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
PRESENT ~~TEMP~~:	74	74	74	74	78	78	78	78
REQUIRED T'STAT:	68	55	68	55	78°F	OFF	78°F	OFF

THERMOSTAT LOCATION(S): STACKS COLUMNS & WALLS (4 EA); CORRIDOR & CONF
NO HUMIDIFICATION REQUIREMENTS (RH): ____ H'STAT LOCATION(S): ________

LIGHTING:

	AREA (SF)	LAMP TYPE	#LMPS	W/SF	SCHEDULE
1)	27,300	FL/INC		1.9	ON OCCUPANCY
2)					ON ___ OFF ___
3)					ON ___ OFF ___
4)					ON ___ OFF ___

DATA SOURCE: ✓ OBSERVATION ___ ASHRAE ___ OTHER
SEE ATTACHED SCHEDULE? ✓ Y ___ N

ELECTRIC EQUIPMENT:

	AREA (SF)	TYPE	(KW)	W/SF	SCHEDULE
1)	27,300			.125	ON OCCUPANCY
2)					ON ___ OFF ___
3)					ON ___ OFF ___
4)					ON ___ OFF ___

DATA SOURCE: ✓ OBSERVATION ___ ASHRAE ___ OTHER
SEE ATTACHED SCHEDULE? ___ Y ✓ N

INTERNAL MASS: MATERIAL: BOOKS ESTIMATED MASS: M (L, M, H)

INFILTRATION: LOCATION(S): FIXED WINDOWS, VESTIBULE ENTRIES, FIRE DOORS, EMPLOYEE ENTRANCE

ESTIMATED RATE: _____ (L, M, H) or
_____ AIR CHANGES or 3950 CFM
_____ CFM/LIN FT CRACK

SPACE TEMP - 76°F
OA TEMP - 50°F

*** FMEA SURVEY OBSERVATIONS ***

GENERAL BUILDING DATA

CONSTRUCTION:

WALLS:

	CONSTRUCTION COMPONENT	WIDTH	HEIGHT	AREA (SF)	U-VALUE
N:	EXTWALL 101 ***	153'-6"	16'-4"	2358.5	0.103
S:	"	153'-6"	16'-4"	2210.9	0.103
E:	"	229'-4"	16'-4"	3458.3	0.103
W:	"	229'-4"	16'-4"	3332.5	0.103

ROOFS:

CONSTRUCTION COMPONENT	WIDTH	HEIGHT	AREA (SF)	U-VALUE
ROOF 42 ***	230'-0"	118'-9'	27,300	0.11

WINDOWS:

	AREA (SF)	TYPE	SF	DP	DRAPES
N:	144.0	FIXED	✓		
S:	291.6	"	✓		
E:	277.2	"	✓		
W:	402.0	"	✓		

FLOOR TYPE: ✓ SLAB ___ CRAWL SPACE ___ BASEMENT ___ OTHER*
AREA: 27,300 SF

PERIMETER: 770 LF INSULATION? ✓ Y ___ N 2 IN TO 24" B.G.

SPECIAL AREAS: ______

ADDITIONAL NOTES: * BUILDING OCCUPIED FROM 0700 TO 1000 BY STAFF ONLY (~6 PEOPLE).

** COOLING IN CONFERENCE ROOM ONLY - 7 1/2 TON DX.

*** SEE ATTACHED "BLAST SIMULATION LIBRARY NON-STD DEFINITIONS"

ALL T-STATS SET 5-6° BELOW MEASURED TEMP, INDICATE 2-3° ABOVE SET TEMP, EXCEPT CONFERENCE RM.

FILM #: ________ FRAME #: ________

SKETCHES:

* Specify in "Additional Notes"

*** FMEA SURVEY OBSERVATIONS ***

GENERAL BUILDING DATA

ITING SCHEDULE

AREA: (A) MAIN 27,300 ____ SF (B) MEZZ ______________ SF

(A) _________ X _________ (B) _________ X _________

DATA SOURCE: ✓ DRAWINGS ✓ SURVEY TOUR

Mark	#lamps	W/Fix	#Fix	SCHED	Comments
F	6	210	64	100%	STACK AREA
F	4	142	61	"	STACK AREA
F	3	105	24	"	STACK AREA / STUDY RMS
F	4	142	24	"	CHILDREN'S ROOM
F	4	142	18	"	MILITARY RDG
F	4	142	68	"	OFFICES
F	4	142	24	25%	CONFERENCE
F	2	71	7	100%	READING ROOMS
	3	105	22	"	REFERENCE STACKS
I	1	150	18	25%	
I	1	150	18	PHOTO-CELL	VESTIBULE / EXT. LIGHTING

(A) TOTAL: 51,857 ______ Watts / 27,300 ________ SF = 1.900 W/SF

(B) TOTAL: ______________ Watts / __________________ SF = ________ W/SF

ADDITIONAL NOTES:

Bldg No.: 1528 ____

*** FMEA SURVEY OBSERVATIONS ***

GENERAL BUILDING DATA

MISCELLANEOUS BASE LOADS:
DOMESTIC HOT WATER:

MANUFACTURER & MODEL 50 GAL
FUEL SOURCE ✓ NAT GAS ___ ELEC ___ OIL ___ STM GEN ___ OTHER*
SUPPLY TEMPERATURE OFF °F, DISTANCE FROM HEATER _____ FT
INPUT 42,000 RECOVERY RATE 35.3GPH OPERATING SCHEDULE SHUT OFF

EXTERIOR LIGHTING:

TYPE ______________ NO ___ SCHEDULE ___________ CONTROL _________
TYPE ______________ NO ___ SCHEDULE ___________ CONTROL _________
TOTAL KW __________
FUNCTION OF LIGHTS ___ SECURITY ___ PARKING LOT ___ ENTRY ___ OTHER*

ADDITIONAL COMMENTS: Individual Transformer # 799, 1500 KVA, 3 phase, Manufacturer: G.E., Primary + Secondary Voltage: 7200/12470 Y -277/480

The transformer checks out ok - No overvoltage or overloading.

FILM #: ______ FRAME #: ____________

ADDITIONAL SKETCHES:

* Specify in "Additional Comments"

Bldg No.: 1528

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

HEATING PLANT

NT DESCRIPTION:
NUMBER OF UNITS: 1
MAKE & MODEL: 1) KEWANEE BOILER CORP 38HP
2) LOW SETPT = 150°F ; HIGH SETPT = 180°F
3)
EQUIPMENT: ✓ BOILER ___ DIRECT FIRED ___ STEAM CONV
TYPE: ___STEAM ✓ HW ___CAST IRON ___WATER TUBE, FIRE TUBE
FUEL: NAT GAS ✓ ELECTRIC _____ OIL _____ OTHER ________

MULTIPLE UNIT OPERATION SEQUENCE:
SERIES — PARALLEL —

BURNER STAGES: —

FIRING RATE/FUEL: #1: 1,005 MBH / NAG #2: NONE

BURNER TYPE: ✓ POWER: MFR GORDON-PIATT MOD No. R8-G-05
BLOWER 480/3/60-0.7 A ½ HP @ ______ CFM
CONTRL 120/1/60-5 A
___ATMOS: MFR ________ MOD No. ________

✓ HOT WATER: SUPPLY SIZE 3" TEMPERATURE 140 PRESSURE 17.5 PSI
RETURN SIZE 3" TEMPERATURE _____ PRESSURE ____ PSI
__STEAM: HEADER SIZE _______ TEMPERATURE _____ PRESSURE ____ PSI

ATED CAPACITY: MAX BTUH IN 1,005,000 BTUH
MAX BTUH OUT 804,000 BTUH

CONTROLS: TYPE HONEYWELL ELECTRIC
CONDITION GOOD

PLANT AUXILIARIES:
PUMPS: MT HW 1) 480/3/60 ~2.15 A ~~1/2~~ 1.0 HP (WINTER ONLY)
2) 480/3/60 - ____ A 1/12 ✓ HP (SUMMER ONLY)
COND 1) ____/__/____-____ A __________ HP
2) ____/__/____-____ A __________ HP

FANS: 1) ____/__/____-____ A __________ HP @ ________ CFM
2) ____/__/____-____ A __________ HP @ ________ CFM
3) ____/__/____-____ A __________ HP @ ________ CFM

OTHER 1) ____/__/____-____ A __________ HP
2) ____/__/____-____ A __________ HP

AUX OPERATING SCHEDULES:
PUMPS: HW 1) ON_____ OFF_____ 2) ON_____ OFF_____
COND 1) ON_____ OFF_____ 2) ON_____ OFF_____
FANS: 1) ON_____ OFF_____ 2) ON_____ OFF_____ 3) ON_____ OFF_____
OTHER: 1) ON_____ OFF_____ 2) ON_____ OFF_____

XILIARY FUEL USED: #2 OIL ______ NAT GAS _____ OTHER ______

Bldg No.: 1528

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

OPERATING SCHEDULE: DATE STARTED ________________
DATE STOPPED ________________

	MON - FRI	SAT	SUN
* PRESENT OPERATION:	_____ TO _____	_____ TO _____	_____ TO _____
* REQUIRED OPERATION:	_____ TO _____	_____ TO _____	_____ TO _____

OTHER PLANT COMMENTS: BOILER FIRES @ OATEMP <65°F.

FILM #: _______ FRAME #: ________________________________

SKETCH:

* --> Disregard if the item is the same as the GENERAL BUILDING DATA.

Bldg No.: 1528

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

COOLING PLANT DATA:

● .CRIPTION:
MANUFACTURER: TRANE MODEL: RAS-83F
NUMBER: 1 TYPE: DX ~~CENTRIFUGAL~~ ___ ABSORPTION ___ RECIP
ENERGY SOURCE: ✓ ELEC ___ STM ___ HW ___ OTHER (specify) ___
COMPRESSOR KW 8
CAPACITY: TONS 7½ AGE ___

CONDENSER: ✓ AIR COOLED ___ WATER COOLED
UNIT OPERATION: ___ PARALLEL ___ SERIES
SYSTEM SERVES AHU No(s): ___

COOLING TOWER DATA:
MANUFACTURER: NONE MODEL: ___
TYPE: ___ No. of CELLS: ___
BLOWERS: 1) ___/__/___-___A @___CFM
2) ___/__/___-___A @___CFM
3) ___/__/___-___A @___CFM
DISTANCE TO COOLING TOWER FROM CHILLER ___

CONTROLS & OPSEQ: This unit is used only for a conference room and is seldom used.

CAN A STRAINER CYCLE OR FLAT PLATE HEAT EXCHANGER BE INSTALLED IN THIS CASE? ___

● CHW TEMPERATURE: SUPPLY ___°F, RETURN ___°F, PIPE SIZE ___ IN
CNW TEMPERATURE: SUPPLY ___°F, RETURN ___°F, PIPE SIZE ___ IN

PLANT AUXILIARIES:

PUMPS: CHW	1)	___/__/___Hz	___A	___HP	@___GPM	ON___	OFF___
	2)	___/__/___Hz	___A	___HP	@___GPM	ON___	OFF___
CNW	1)	___/__/___Hz	___A	___HP	@___GPM	ON___	OFF___
	2)	___/__/___Hz	___A	___HP	@___GPM	ON___	OFF___
FANS: COOLING TOWER	1)	___/__/___Hz	___A	___HP	@___GPM	ON___	OFF___
	2)	___/__/___Hz	___A	___HP	@___GPM	ON___	OFF___
CONDENSER	1)	208/3/60 Hz	___A	1/3 HP	~~@___GPM~~	ON___	OFF___
	2)	208/3/60 Hz	___A	1/3 HP	~~@___GPM~~	ON___	OFF___
OTHER	1)	___/__/___Hz	___A	___HP	@___GPM	ON___	OFF___
	2)	___/__/___Hz	___A	___HP	@___GPM	ON___	OFF___

OPERATING SCHEDULE: DATE STARTED ___
DATE STOPPED ___

	MON - FRI	SAT	SUN
* PRESENT OPERATION:	___ TO ___	___ TO ___	___ TO ___
* REQUIRED OPERATION:	___ TO ___	___ TO ___	___ TO ___

● -> Disregard if the item is the same as the GENERAL BUILDING DATA.

Bldg No.: 1528

***** FMEA SURVEY OBSERVATIONS *****

MECHANICAL EQUIPMENT DATA

✓ AIR HANDLING UNITS:
MANUFACTURER TRANE MODEL No. ________
AHU NUMBER: HV-1 AHU TYPE: HORIZONTAL DRAW-THRU
LOCATION: PENTHOUSE SPACE SERVED: ________

✓ FAN DATA:
SUPPLY FAN HP: 7.5 (current setting 2.2) SUPPLY CFM: 12730 (8520/) STATIC PRESS: 1/8"
RETURN FAN HP: — RETURN CFM: — STATIC PRESS: —
EXHAUST FAN HP: — EXHAUST CFM: — STATIC PRESS: —
MOTOR STARTER: MNT __ MOM __. SWITCH: P.B. __ H.O.A. ✓ DISCON __

COILS:
HEATING: HW ✓ STM __ DIRECT FIRED --> NG __ OIL __ ELC __ OTHER __
NO COOLING: CW __ DX __. FROM CHILLER ________, FROM DX UNIT ________
REHEAT: # OF COILS 2 TYPE ELEC. ~~RECOOL~~: # OF COILS ___ TYPE ___
NO HUMIDITY: STM __ SPRAY __ ELC __. HW/CW COIL VALVES: 2 WAY __, 3 WAY __

DAMPERS:
O.A. DAMPER: Y (Y, N), IF YES, FIXED —%, MODULATING 0 % TO 100%
R.A. DAMPER: Y (Y, N), IF YES, FIXED —%, MODULATING 0 % TO 100%
E.A. DAMPER: N (Y, N), IF YES, FIXED —%, MODULATING __% TO __%
ECONOMIZER: N (Y, N), IF YES, OA — RA — ENTHALPY —
OA LEAKAGE: 15 % IF NO, CAN ECONOMIZER BE ADDED ________

FILTER CONDITION: ✓ GOOD ___ FAIR ___ POOR

✓ SYSTEM OPERATION:

	MON - FRI	SAT	SUN
*PRESENT OPERATION:	CONTINUOUS	_____ TO _____	_____ TO _____
*REQUIRED OPERATION:	CONTINUOUS	_____ TO _____	_____ TO _____

	HEATING SETPOINTS WEEKDAYS DAY	NIGHT	WEEKENDS* DAY	NIGHT	COOLING SETPOINTS WEEKDAYS DAY	NIGHT	WEEKENDS DAY	NIGHT
*PRESENT TEMP:	76				—	—	—	—
*REQUIRED TMP:	68	58	58	58	—	—	—	—

NO HUMIDIFICATION REQUIREMENTS (RH): ____ HUMIDISTAT LOCATION: ____

SYSTEM SETPOINTS: MIXED AIR ~~55~~ 60 °F, HOT DECK ___ °F, COLD DECK ___ °F
TIME CLOCK: N (Y, N), IF YES, IS IT OPERATIONAL ___ (Y, N)

CONTROLS: PNEUMATIC ______, ELECTRIC HONEYWELL PNEUMATIC/ELEC ______

✓ EQUIPMENT CONDITION: EXCELLENT(E), GOOD(G), POOR(P) T'STAT G
H'STAT — COMPR — DAMPERS G LINKAGES G FANS G SHEAVES G
VALVES G ACTUATORS G BELTS G MIXING BOX G
OTHER ___

COMMENTS: REHEAT COILS ARE 7.5 KW (25,500 BTUH) AND 15 KW (51,200 BTUH). THEY SERVE ROOM 132 EAST & WEST. BOTH ON T-STATS. Mixed Air set at 60°F; two position control either all RA. or all O.A.
* SUNDAYS & HOLIDAYS

Bldg No.: 1528

*****__FMEA_SURVEY_OBSERVATIONS__*****

MECHANICAL_EQUIPMENT_DATA

✓ HANDLING UNITS:
MANUFACTURER ______________________ MODEL No. ________________
AHU NUMBER: HV-2 AHU TYPE: HORIZONTAL DRAW THRU __________
LOCATION: PENTHOUSE ______ SPACE SERVED: ____________________

✓ FAN DATA:
SUPPLY FAN HP: 22/5 SUPPLY CFM: 6967/ 10455 STATIC PRESS: 1 1/8"
RETURN FAN HP: — RETURN CFM: — STATIC PRESS: —
EXHAUST FAN HP: — EXHAUST CFM: — STATIC PRESS: —
MOTOR STARTER: MNT __ MOM __. SWITCH: P.B. __ H.O.A. ✓ DISCON __

COILS:
HEATING: HW ✓ STM __ DIRECT FIRED --> NG __ OIL __ ELC__ OTHER __
NO COOLING: CW __ DX __. FROM CHILLER _________, FROM DX UNIT _______
NO REHEAT: # OF COILS ___ TYPE _____. RECOOL: # OF COILS ___ TYPE ____
NO HUMIDITY: STM __ SPRAY __ ELC __. HW/CW COIL VALVES: 2 WAY __, 3 WAY __

DAMPERS:
O.A. DAMPER: Y (Y, N), IF YES, FIXED —%, MODULATING 0% TO 100%
R.A. DAMPER: Y (Y, N), IF YES, FIXED —%, MODULATING 0% TO 100%
E.A. DAMPER: N (Y, N), IF YES, FIXED —%, MODULATING __% TO __%
ECONOMIZER: N (Y, N), IF YES, OA — RA — ENTHALPY —
OA LEAKAGE: __10___% IF NO, CAN ECONOMIZER BE ADDED _________

TER CONDITION: ✓ GOOD ___FAIR ___POOR

STEM OPERATION: SEE HV-1 MON - FRI SAT SUN
*PRESENT OPERATION: ______ TO _____ _____ TO _____ _____ TO _____
*REQUIRED OPERATION: _____ TO _____ _____ TO _____ _____ TO _____

	HEATING SETPOINTS				COOLING SETPOINTS			
	WEEKDAYS		WEEKENDS		WEEKDAYS		WEEKENDS	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
*PRESENT TEMP:	_____	_____	_____	_____	_____	_____	_____	_____
*REQUIRED TMP:	_____	_____	_____	_____	_____	_____	_____	_____

HUMIDIFICATION REQUIREMENTS (RH): ____ HUMIDISTAT LOCATION: _____

SYSTEM SETPOINTS: MIXED AIR ___°F, HOT DECK ___°F, COLD DECK ___°F
TIME CLOCK: N (Y, N), IF YES, IS IT OPERATIONAL ___ (Y, N)

CONTROLS: PNEUMATIC ______, ELECTRIC HONEYWELL, PNEUMATIC/ELEC ______

EQUIPMENT CONDITION: EXCELLENT(E), GOOD(G), POOR(P) T'STAT G
H'STAT — COMPR — DAMPERS G LINKAGES G FANS G SHEAVES G
VALVES G ACTUATORS G BELTS G MIXING BOX G
OTHER___

COMMENTS: STM coil in HV; No control Valve; coil ________; 2" STM COIL LINES.

Bldg No.: 1528

__FMEA_SURVEY_OBSERVATIONS__

MECHANICAL_EQUIPMENT_DATA

AIR HANDLING UNITS:
MANUFACTURER ________________________ MODEL No. ____________________
AHU NUMBER: _1&2_ AHU TYPE: _HORIZONTAL DRAW-THRU________
LOCATION: _PENTHOUSE______ SPACE SERVED: ____________________

FAN DATA:
SUPPLY FAN HP: _5_ SUPPLY CFM: 12,950 STATIC PRESS: 1
RETURN FAN HP: _—_ RETURN CFM: _—_ STATIC PRESS: _—_
EXHAUST FAN HP: _—_ EXHAUST CFM: _—_ STATIC PRESS: _—_
MOTOR STARTER: MNT __ MOM __. SWITCH: P.B. __ H.O.A. ✓ DISCON __

COILS:
HEATING: HW __ STM __ DIRECT FIRED --> NG __ OIL __ ELC__ OTHER __
COOLING: CW __ DX __. FROM CHILLER _________, FROM DX UNIT _______
REHEAT: # OF COILS ___ TYPE _____. RECOOL: # OF COILS ___ TYPE ____
HUMIDITY: STM __ SPRAY __ ELC __. HW/CW COIL VALVES: 2 WAY __, 3 WAY __

DAMPERS:
O.A. DAMPER: Y (Y, N), IF YES, FIXED _—_%, MODULATING Ø% TO 100%
R.A. DAMPER: Y (Y, N), IF YES, FIXED _—_%, MODULATING Ø% TO 100%
E.A. DAMPER: Y (Y, N), IF YES, FIXED _—_%, MODULATING Ø% TO 100%
ECONOMIZER: ~~Y~~ (Y, N), IF YES, OA ~~70~~° RA __ ENTHALPY __
OA LEAKAGE: _1Ø___% IF NO, CAN ECONOMIZER BE ADDED ________

FILTER CONDITION: ___GOOD ___FAIR ___POOR NONE

SYSTEM OPERATION:*	MON - FRI	SAT	SUN
*PRESENT OPERATION:	CONTINUOUS___	_____ TO _____	_____ TO _____
*REQUIRED OPERATION:	BLDG SCHEDULE	_____ TO _____	_____ TO _____

	HEATING SETPOINTS				COOLING SETPOINTS			
	WEEKDAYS		WEEKENDS		WEEKDAYS		WEEKENDS	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
*PRESENT TEMP:	_____	_____	_____	_____	_____	_____	_____	_____
*REQUIRED TMP:	_____	_____	_____	_____	_____	_____	_____	_____

HUMIDIFICATION REQUIREMENTS (RH): ____ HUMIDISTAT LOCATION: _____

SYSTEM SETPOINTS: 100% O.A. ~~MIXED~~ AIR 75 ~~55~~ °F, HOT DECK ___°F, COLD DECK ___°F
TIME CLOCK: _N_ (Y, N), IF YES, IS IT OPERATIONAL ___ (Y, N)

CONTROLS: PNEUMATIC ______, ELECTRIC HONEYWELL, PNEUMATIC/ELEC ______

EQUIPMENT CONDITION: EXCELLENT(E), GOOD(G), POOR(P) T'STAT _—_
H'STAT _—_ COMPR _—_ DAMPERS _P_ LINKAGES _G_ FANS _G_ SHEAVES _G_
VALVES _—_ ACTUATORS _—_ BELTS _G_ MIXING BOX _G_
OTHER___

COMMENTS: *UNIT OPERATES SUMMER ONLY at below 75°F @ A. Temp.

____

____

Bldg No.: 1528____

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

HANDLING UNITS:

NTROL STRATEGY: SUMMER - AHU 1 & 2 ON @ OA ≥ ~~70°~~ 75° F

WINTER - AHU 1 & 2 OFF, 3 & 4 ON, BOILER ON @ OA < 65°

NIGHT - AHU 1 & 2 OFF

ADDITIONAL AHU/SYSTEM COMMENTS:

MTHW RESET SCHED -

OA	SUPPLY WATER TEMP, °F
5°	195°
65°	120°

7'-0 SPACE ABOVE CEILING IS RA PLENUM. LIGHT FIXTURES ARE SA DIFFUSERS. RA GRILLES ARE LAY-IN EGG-CRATE TYPE.

FILM #: FRAME #:

SYSTEM SKETCH:

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

UNITARY HEATING EQUIPMENT:

UNIT NO.	TYPE	OUTPUT CAPACITY	HEATING SOURCE	CFM	HP	STARTER & CONTROL	SETPOINT
CUH-1	UNIT	14,000	MTHW	—	—	24 V STAT	70°
CUH-1	"	40,000	"	—	—	"	"

UNITS LOCATED ONE (1) IN EACH VESTIBULE.

FILM #: _______ FRAME #: _______

NOTES: TYPE --> unit heater, unit ventilator, duct furnace, wall furnace, etc.
HEATING SOURCE --> electric, gas fired, oil, steam, hot water, etc.
STARTER & CONTROL --> momentary, maintained, line v stat, 24 v stat, self contained, etc.

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

AUST FANS:

UNIT NO.	TYPE			CFM	HP	STARTER & CONTROL	SETPOINT
EF-1	CENT	TOILET	.375"SP	600	1/12	W/LIGHTS	—
EF-2	PROP	BOILER RM	.25"SP	2460	1/2	L.V. STAT	85°F
EF-3	PROP	PENTHOUSE	.25"SP	2560	1/2	"	"

FILM #: ________ FRAME #: ________

NOTES: TYPE --> propeller, centrifugal, etc.
STARTER & CONTROL --> momentary, maintained, line v stat, 24 v stat, self contained, etc.

Bldg No.: 1528

GENERAL ENERGY CONSERVATION OPPORTUNITY CHECKLIST

Bldg Name: MAIN LIBRARY Bldg #: 1528 Contact:__________ Phone #:__________ Surveyed By: DG Date:________

ECO TITLE	ANNEX A	DATE	ANNEX B	DATE	COMMENTS
INSULATION	A1		# B01	NO	N/A
STORM WINDOWS or DOUBLE GLAZING	A2		# B02	YES	SP 1/4" [illegible]
WEATHER STRIPPING and CAULKING	A3		# B03	NO	Building B pressurized.
INSULATED PANELS	A4		# B04	YES	ON ALL WINDOWS
VESTIBULES or REVOLVING DOORS	A5		# B05	NO	N/A- IN PLACE
LOAD DOCK SEALS (Strip Door or Air Cu)	A6		B06	NO	N/A- LD ENCLOSED
REDUCTION of GLASS AREA	A7		B07		SEE B04
REPLACE KITCHEN LIGHT FIXTURES	A8		# B08		SEE B10
SHUTDOWN DHW or MOD CTRLS (Non FH)	A9		B09	NO	DHW OFF
REDUCE LIGHTING LEVELS	A10		# B11	NO	
REPLACE INCANDESCENT LIGHTING	A11		# B12		SEE B10
USE MORE EFFICIENT LIGHTING SOURCE	A12		# B10	NO	NA - IN PLACE
HIGH EFFICIENCY MOTOR REPLACEMENT	A13		B13	YES	ON AHU'S & PUMPS
NIGHT SETBACK/SETUP THERMOSTATS *	A14		# B14	YES	
INFRARED HTRS (Motor Rep Shops & Whse)	A15		# B15	NO	N/A
ECONOMIZER CYCLES (Dry Bulb Type)	A16		# B16		N/A
CONTROL HOT WATER CIRC PUMP *	A17		# B17	NO	N/A
~~FM RADIO CONTROLS~~	~~A18~~		~~B18~~		
RADIATOR CONTROLS	A19		B19	NO	IN PLACE
DECENTRALIZE DHW HTRS (POU Htrs) *	A20		B	NO	DHW OFF
HEAT RECLAIM from HOT REFRIG GAS	A21		# B20	NO	NONE AVAIL IN HTG SEASON
REDUCE AIR FLOW *	A22		# B21	NO	N/A
PREVENT AIR STRATIFICATION *	A23		# B22	NO	NO STRAT
INSTALL TIME CLOCKS	A24		B23	NO	N/A
CHILLER REPLACEMENT	A25		B	NO	NO COOLING
REPLACE ABSORPTION CHILLER	A26		B38	NO	"
INSULATE STEAM LINES	A27		B26	NO	MTHW BOILER
RETURN CONDENSATE	A28		B27	NO	"
TRANSFORMER OVERVOLTAGE	A29		B31	YES	
TRANSFORMER LOADING	A30		B30	YES	
REVISE OR REPAIR HVAC CONTROLS	A31		B32	YES	
WASTE HEAT RECOVERY *	A32		B33	NO	NONE AVAILABLE
ADD ADDITIONAL LIGHT SWITCHES	A33		B35	NO	ADEQUATE
HVAC INIT/BLDGS WITH SEPARATE BOILERS	A34		# B37	NO	
STANDARD SOLUTIONS for EXT LIGHTS	A35		# B36	NO	ON P/C CONTROL
BOILER OXYGEN TRIM CONTROLS	A		B24	YES	ADAPTIVE TYPE
REVISE BOILER CONTROLS	A		B25	NO	1 BOILER
PRE-HEAT DHW	A		B28	NO	NO DHW
HEAT PUMPS	A		# B29	NO	
EMCS	A		B39	YES	
HOT WATER RECIRC PUMPS	A		M40,17	—	
HPS STREET LIGHTS	A		M41	—	
ELECTRIC OUTLET INSULATION	A		M42	—	

<*> Denotes ECO's studied by Burns & McDonnel

<#> Denotes ECO's common to Military Family Housing

*** FMEA SURVEY OBSERVATIONS ***

9/92
AJN/JOE

GENERAL BUILDING DATA

BLDG #: P-1855 BLDG NAME: Dental Clinic JOB #: 124
SURVEYED BY: ~~RT/RWH~~ DATE: ~~28 Nov 89~~ BLDG CONTACT: SSG Rogers
CONTACT TELEPHONE NUMBER: X 4449 BLDG USAGE: dental Care
TOT BLDG AREA: 14,615 SF # OF FLOORS: 1 # OF PEOPLE: 50 + 150 patients

BUILDING OCCUPANCY:

MON - FRI:	0715	TO	1600	FIRST SHIFT:	____
SATURDAY:	closed	TO	closed	SECND SHIFT:	____
SUNDAY:		TO		THIRD SHIFT:	____
HOLIDAYS:		TO		HOLIDAYS:	____

ENVIRONMENTAL CONDITIONS:

	HEATING SETPOINTS WEEKDAYS DAY	HEATING WEEKDAYS NIGHT	HEATING WEEKENDS DAY	HEATING WEEKENDS NIGHT	COOLING SETPOINTS WEEKDAYS DAY	COOLING WEEKDAYS NIGHT	COOLING WEEKENDS DAY	COOLING WEEKENDS NIGHT
PRESENT T'STAT:	72	72	72	72	72	72	72	72
REQUIRED T'STAT:	68	55	55	55	78	—	—	—

THERMOSTAT LOCATION(S): Hallways and rooms on interior partition walls.
HUMIDIFICATION REQUIREMENTS (RH): ____ H'STAT LOCATION(S): ____

LIGHTING:

	AREA (SF)	LAMP TYPE	#LMPS	W/SF	SCHEDULE ON	OFF
1)	ZN1: 6365	Fluo and incand - See		1.56	0715	1600
2)	ZN2: 8258	page 3.		1.93	0715	1600
3)						
4)						

DATA SOURCE: X OBSERVATION ___ ASHRAE ___ OTHER (est 10% on at night)
SEE ATTACHED SCHEDULE? X Y ___ N see page 3 of 1

ELECTRIC EQUIPMENT:

	AREA (SF)	TYPE	(KW)	W/SF	SCHEDULE ON	OFF
1)	ZN1: 6365	Miscellaneous Dental Equip	est:	1.0 W/SF	0715	1600
2)	ZN2: 8258	and typewriters, etc	est:	.75 W/SF	0715	1600
3)						
4)						

DATA SOURCE: X OBSERVATION ___ ASHRAE ___ OTHER (est 5% on at night)
SEE ATTACHED SCHEDULE? ___ Y X N

INTERNAL MASS: MATERIAL: Equip, partitions, Concrete ESTIMATED MASS: _ (L, M, H)

INFILTRATION: LOCATION(S): Vestibule (Main entrance) saves much energy by keeping out infiltration. Building is slightly pressurized.

ESTIMATED RATE: ____ (L, M, H) or
✓ AIR CHANGES or
____ CFM/LIN FT CRACK

HEATED BLDG VOLUME = ZN1 50,920 CF ZN2 66,064 CF

Assume no infiltration due to pressurization and use of vestibules.

__FMEA_SURVEY_OBSERVATIONS__

GENERAL_BUILDING_DATA

CONSTRUCTION:

WALLS:	CONSTRUCTION COMPONENT	WIDTH	HEIGHT	NET AREA (SF)	U-VALUE
NE ~~N~~:	6" Brick masonry unit, 2"	137	12	1452	0.11
SE ~~S~~:	rigid insulation, gyp board	109/89	12/4	1,485	0.11
SW ~~E~~:	↓	137	12	1,486	0.11
NW ~~W~~:	↓	109/89	12/4	1,507	0.11

ROOFS:	CONSTRUCTION COMPONENT	WIDTH	HEIGHT	AREA (SF)	U-VALUE
ZN1:	Built up Roof, 5" Rigid	95	67	6365	0.05
NE ZN2:	insulation, 2 1/2" concrete,	137	21	2877	0.05
SE ZN2:	Air space, dropped ceiling.	67	21	1407	0.05
SW ZN2:	↓	137	21 (-310)	2567	0.05
NW ZN2:		67	21	1407	

WINDOWS:	AREA (SF)	TYPE	SP	DP	DRAPES
NE ~~N~~:	192 (*)	Aluminum frame	✓		
SE ~~S~~:	179 (**)	↓	✓		
SW ~~E~~:	158 (***)	↓	✓		
NW ~~W~~:	157 (****)	↓	✓		
HORIZONTAL:	198		✓		

U = 1.18

FLOOR TYPE: ___ SLAB _X_ CRAWL SPACE ___ BASEMENT ___ OTHER*

AREA: 6365 SF (Located under interior zone)

PERIMETER: 492 LF INSULATION? X Y ___ N ___ IN → 1 1/2" rigid

U = .2

SPECIAL AREAS: ______

ADDITIONAL NOTES: T-stats are single set point (Robert Shaw). Most stats set for 70° to 73°F. The crawl space is heated by the mechanical Room, therefor assume no floor heat loss.

NOTE: The building is slightly pressurized, therfor infiltration is low.

FILM #: ________ FRAME #: ________

SKETCHES:

(*) (3)(11.3 SF) + (4)(22.6 SF) + (2)(33.9 SF) = 192 SF

(**) (3)(11.3 SF) + (2)(73 SF) (doors) = 179 SF

(***) (3)(11.3 SF) + (2)(22.6 SF) + (1)(33.9 SF) + (1)(45.2 SF) = 158 SF

(****) (1)(11.3 SF) + (2)(73 SF) (doors) = 157 SF

* Specify in "Additional Notes"

Bldg No.: P-1855

*** FMEA SURVEY OBSERVATIONS ***

GENERAL BUILDING DATA

ꟷGHTING SCHEDULE

Page ___of___

AREA: (A)MAIN____________SF (B)MEZZ____________SF
(A)________X________ (B)________X________

DATA SOURCE: X DRAWINGS ___SURVEY TOUR

Mark	#lamps	W/Fix	#Fix	Flr #	Comments	
Center	fluorescent	76	131		9,956	(ZN1 int)
SW	fluorescent	76	7		532	(ZN2)
SW	incandescent	150	17		2,550	
NW	fluor	76	10		760	
NW	incand.	200	3		600	
NE	fluor	76	62		4,712	
NE	fluor	76	27		2,052	
SE	fluor	76	49		3,724	
E	incand.	200	5		1,000	(ZN2)

ZN 1
(A)TOTAL: 9,956 Watts/ 6,365 SF= 1.56 W/SF

ZN 2
(B)TOTAL: 15,930 Watts/ 8,258 SF= 1.93 W/SF

ADDITIONAL NOTES:

Bldg No.: P-1855

__FMEA_SURVEY_OBSERVATIONS__

GENERAL BUILDING DATA

MISCELLANEOUS BASE LOADS:
DOMESTIC HOT WATER:
MANUFACTURER & MODEL Domestic Hot Water Convertor HE2
FUEL SOURCE ___ NAT GAS ___ ELEC ___ OIL ___ STM GEN ✓ OTHER*
SUPPLY TEMPERATURE 140 °F. DISTANCE FROM HEATER _____FT
INPUT ______ RECOVERY RATE _______ OPERATING SCHEDULE ___________

EXTERIOR LIGHTING:
TYPE ______________ NO ___ SCHEDULE ___________ CONTROL _________
TYPE ______________ NO ___ SCHEDULE ___________ CONTROL _________
TOTAL KW __________
FUNCTION OF LIGHTS ___ SECURITY ___ PARKING LOT ___ ENTRY
___ OTHER*

ADDITIONAL COMMENTS: Valve modulates to maintain 140°F. supply temperature from HTHW.
DHW circulating pump → 1/12 hp; Storage tank temperature is maintained at 178°F.
1½" 2-WAY DeZurik Control Valve (Pneu.) on HTHW (HW Convertor); 2½" 3-WAY Control Valve HW Coil AHU Pneu. Robert Shaw,
Individual Transformer # 656: 150 KVA, 3 Phase,
Manufacturer: G.E., Primary + Secondary Voltage: 7200/12470Y -277/480

FILM #: ______ FRAME #: ______________________________

ADDITIONAL SKETCHES:

The Transformer checks out OK - No overvoltage or over loading.

* Specify in "Additional Comments"

Bldg No.: P-1855

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

COOLING PLANT DATA:

DESCRIPTION: ✓

MANUFACTURER: Trane (~~CHW~~ DX Compressor) MODEL: RAUA 4004 - RB

NUMBER: 1 TYPE: ___ CENTRIFUGAL ___ ABSORPTION ___ RECIP

ENERGY SOURCE: ✓ ELEC ___ STM ___ HW ___ OTHER(specify) ____________

COMPRESSOR KW ____________

CAPACITY: TONS 15 AGE 1976

CONDENSER: X AIR COOLED ___ WATER COOLED

UNIT OPERATION: ___ PARALLEL ___ SERIES

SYSTEM SERVES AHU No(s): 1

COOLING TOWER DATA:

MANUFACTURER: Trane MODEL: ____________

TYPE: ____________ No. of CELLS: _____

BLOWERS: 1) _____/__/_____-____A @_____CFM

2) _____/__/_____-____A @_____CFM

3) _____/__/_____-____A @_____CFM

DISTANCE TO COOLING TOWER FROM CHILLER ____________

CONTROLS & OPSEQ: ____________

CAN A STRAINER CYCLE OR FLAT PLATE HEAT EXCHANGER BE INSTALLED IN THIS CASE? ____________

CW TEMPERATURE: SUPPLY ___°F, RETURN ___°F, PIPE SIZE ________IN

CNW TEMPERATURE: SUPPLY ___°F, RETURN ___°F, PIPE SIZE ________IN

PLANT AUXILIARIES:

1.5 GE 208-230/460V; 5.8-5.6/2.8V for MZU.

PUMPS:

CHW 1) ______/__/___Hz ___A 2 HP @____GPM ON_____OFF_____

HW 2) 230 / 3 / 60 Hz 5.0 A 1.5 HP @____GPM ON_____OFF_____

~~CNW~~ 1) ______/__/___Hz ___A ___HP @____GPM ON_____OFF_____

CHW 2) ______/__/___Hz ___A 2 HP @____GPM ON ✓ ~~OFF~~ → for chilled water convertor. DX To converter from Trane DX compressor.

~~FANS:~~

COOLING TOWER 1) ______/__/___Hz ___A ___HP @____GPM ON_____OFF_____

2) ______/__/___Hz ___A ___HP @____GPM ON_____OFF_____

CONDENSER FANS 1) ______/__/___Hz ___A 1.5 HP @____GPM ON_____OFF_____

3) ______/__/___Hz ___A 1.5 HP @____GPM ON_____OFF_____

~~OTHER~~ 4) ______/__/___Hz ___A 1.5 HP @____GPM ON_____OFF_____

5) ______/__/___Hz ___A 1.5 HP @____GPM ON_____OFF_____

OPERATING SCHEDULE: DATE STARTED May

DATE STOPPED September

	MON - FRI	SAT	SUN
* PRESENT OPERATION:	_____ TO _____	_____ TO _____	_____ TO _____
* REQUIRED OPERATION:	_____ TO _____	_____ TO _____	_____ TO _____

● —> Disregard if the item is the same as the GENERAL BUILDING DATA.

Bldg No.: P-1855

__FMEA_SURVEY_OBSERVATIONS__

MECHANICAL_EQUIPMENT_DATA

✓ AIR HANDLING UNITS:
MANUFACTURER __Trane Climate Changer__ MODEL No. Type 41
AHU NUMBER: _1_ AHU TYPE: __Multizone__
LOCATION: MER basement____ SPACE SERVED: __all the clinic______

✓ FAN DATA:
SUPPLY FAN HP: _20_ SUPPLY CFM: 20,565 STATIC PRESS: 3.5"
RETURN FAN HP: est. 10/5 RETURN CFM: 15,370 STATIC PRESS: 1.25"
EXHAUST FAN HP: ___ EXHAUST CFM: ____ STATIC PRESS: ___
MOTOR STARTER: MNT __ MOM __. SWITCH: P.B. __ H.O.A. __ DISCON __

✓ COILS:
HEATING: HW ✓ STM __ DIRECT FIRED --> NG __ OIL __ ELC__ OTHER __
COOLING: CW ✓ DX __. FROM CHILLER _________, FROM DX UNIT _______
REHEAT: # OF COILS ___ TYPE _____. RECOOL: # OF COILS ___ TYPE ____
HUMIDITY: STM __ SPRAY __ ELC __. HW/CW COIL VALVES: 2 WAY __, 3 WAY ✓

DAMPERS:
O.A. DAMPER: Y (Y, N), IF YES, FIXED __%, MODULATING 25% TO 75%
R.A. DAMPER: Y (Y, N), IF YES, FIXED __%, MODULATING 25% TO 75%
E.A. DAMPER: Y (Y, N), IF YES, FIXED __%, MODULATING __% TO __%
ECONOMIZER: Y (Y, N), IF YES, OA __ RA __ ENTHALPY ✓ (cooling)
OA LEAKAGE: _15___% IF NO, CAN ECONOMIZER BE ADDED _________

FILTER CONDITION: ✓ GOOD ___FAIR ___POOR

SYSTEM OPERATION:	MON - FRI	SAT	SUN
*PRESENT OPERATION:	______ TO _____	_____ TO _____	_____ TO _____
*REQUIRED OPERATION:	______ TO _____	_____ TO _____	_____ TO _____

	HEATING SETPOINTS				COOLING SETPOINTS			
	WEEKDAYS		WEEKENDS		WEEKDAYS		WEEKENDS	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
*PRESENT TEMP:	_____	_____	_____	_____	_____	_____	_____	_____
*REQUIRED TMP:	_____	_____	_____	_____	_____	_____	_____	_____

HUMIDIFICATION REQUIREMENTS (RH): 50% ← set point HUMIDISTAT LOCATION: _____

SYSTEM SETPOINTS: MIXED AIR 55 °F, HOT DECK 75-95 °F, COLD DECK _Δ_ °F 50°-70° adj.
TIME CLOCK: Yes (Y, N), IF YES, IS IT OPERATIONAL No (Y, N)
50°F setpt on Chilled Water Return
CONTROLS: PNEUMATIC ______, ELECTRIC ______, PNEUMATIC/ELEC ✓

EQUIPMENT CONDITION: EXCELLENT(E), GOOD(G), POOR(P) T'STAT G
H'STAT ___ COMPR ___ DAMPERS G LINKAGES G FANS G SHEAVES G
VALVES G ACTUATORS G BELTS G MIXING BOX G
OTHER___

✓ COMMENTS: The MZU was designed with submaster controllers for the zone mixing values. These have been disconnected and the dampers are now directly controlled by thermostat branch line Pressure only (15# cool, 0# heat) this change was made on 27 Oct 78.

Bldg No.: 1855

MECHANICAL EQUIPMENT DATA

HANDLING UNITS:
CONTROL STRATEGY: 10 zones on MZU. 10 pnev. damper act. ea Type K
. 4 damper act. are inoperable.

ADDITIONAL AHU/SYSTEM COMMENTS:
The heating coil hot water is generated from the HTHW heat exchanger located in the MER.
HW Coil Capacity ≅ 544,329 BTUH

The system time clock is disconnected.

Chilled water is obtained (for the Air Handler) from the DX compressors refrigerant converted in a shell and tube heat exchanger.

FILM #: ______ FRAME #: ______

SYSTEM SKETCH:

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

UNITARY HEATING EQUIPMENT:

UNIT NO.	TYPE	OUTPUT CAPACITY	HEATING SOURCE	CFM	HP	STARTER & CONTROL	SETPOINT
	Bsbd	800 BTUH/linear foot w/ 65°F EAT and 190°F water temp.					
		Total length of baseboard = 153 linear feet					
		total Capacity = 153 * 800 = 122,400 BTUH					
		All baseboard heaters are controlled by local thermostats.					

FILM #: ______ FRAME #: ______

NOTES: TYPE --> unit heater, unit ventilator, duct furnace, wall furnace, etc.
HEATING SOURCE --> electric, gas fired, oil, steam, hot water, etc.
STARTER & CONTROL --> momentary, maintained, line v stat, 24 v stat, self contained, etc.

Bldg No.: P-1855

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

AUST FANS:

UNIT NO.	TYPE			CFM	HP	STARTER & CONTROL	SETPOINT
EF1	Power Roof exhauster		(Toilet exh)	700	UNK		
EF2			(Toilet & lab exh)	2825			
EF3			(MER exh)	800			
EF4			(Toilet exh)	100			

FILM #: FRAME #:

NOTES: TYPE --> propeller, centrifugal, etc.
STARTER & CONTROL --> momentary, maintained, line v stat,
24 v stat, self contained, etc.

Bldg No.: P-1855

SEQUENCE OF OPERATION

P-1855

I. MULTIZONE UNIT AC-1

A. SF-1 Operation

Supply fan SF-1 and interlocked return exhaust fans REF-1 and REF-2 are normally started and stopped by a seven day timeclock TC-1 chich has spring carry-over feature in the event of a power failure. A manual bypass timer is located in room 7 to allow extended after hours operation. A night low limit thermostat will bypass the timeclock TC-1 to cause both the air handler and hot water pump to operate intermittently to maintain its night setting thus preventing freeze-up. The air handler system AC-1 will shut down any time a freezing or high return air temperature condition exists.

B. Damper Control

Enthalpy controlloer E-1 is provided to control fresh air, exhaust air and recirculating air dampers during cooling. The enthalpy control measures the entalpy of outdoor and return air, compares the two and operates the dampers to provide air to zones having lowest enthalpy. During the day cycle, fresh, exhaust and return air dampers are controlled by a mixed air receiver-controller RC-1 set at 55° F. When the unit if off, fresh and exhaust air dampers shall close completely while return air damper will remain open. When unit is on day cycle, the fresh and exhaust air dampers will be prevented from closing completely by a minimum position switch.

could not access

C. Cooling Coil Control

A 3-way modulating valve is provided in the chilled water flow line to the multizone cooling coil. Cooling is controlled by receiver-controller RC-3 which modulates chilled water valve V-9. A panel mounted gradual switch mounted on the panel door permits adjusting the cold plenum set point between 50° F and 70° F.

oporable

D. Heating Coil Control

The heating coil control valve V-10 is modulated by receiver-controller RC-2 which is reset by the outside air temperature according to reset schedule #1.

E. Warm Up Control

Warm up controller DR-1 has its sensing element located in the return air duct and is set at 67° F. Controller DR-1 keeps the fresh air and exhause air dampers closed and the recirculating air damper open when the return air temperature is below 67° F.

II. TERMINAL UNITS

A. Multizone Damper Control

Submaster controllers control the mixing dampers at unit AC-1 for each zone.

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B. Radiation Control

A 2-way valve at each baseboard radiator is modulated by a space thermostat. Where a space thermostat also controls a multizone damper, the radiator control valve and multizone damper are controlied simultaneously.

C. Cabinet Unit Heaters

A space thermostat modulates a 2-way control valve at each cabinet unit heater. Some cabinet units heater operate simultaneously with hot water or electric baseboard raidators. A strap on thermostat upstream of each control valve prevents the cabinet unit heaters fan from starting when entering water temperature in less then 90°

III. HOT WATER CONVERTORS

A. Heating Hot Water Convertor HE-1

On normal day cycle operation, 2-way valve V-1 is modulated by receiver-controller RC-5 which is reset by outside air temperature according to reset schedule #2. On morning warm-up cycle, warm-up switch over controller DR-1 will override the outside air reset and allows full temperature water to the heating system.

B. Domestic Hot Water Convertor HE-2

Receiver-controller RC-4 modulates 2-26 valve V-2 to maintain a supply water temperature of 140°F.

IV. PUMPS

A. Hot Water Pump A-3

Hot water circulating pump is automatically controlled by time clock TC-1 but bypass timer BT-1 can override TC-1 and either of the two night low limit htermostats can start the pump. The pump will not operate when outside air temperature is above 70°F.

B. Chilled Water Pump ~~A-4~~

Chilled water circulating pump is manually started by a push-button station in the mechanical room. The pump automatically stops whenever supply fan SF-1 is off or when the timeclock is on night cylce.

V. EXHAUST FANS

A. Exhaust Fans EF-1, EF-2, and EF-4

Toilet and laboratory exhaust fans EF-1, EF-2, and EF-4 are started and stopped by timeclock TC-1 or bypass timer BT-1.

B. Exhaust Fan EF-3

Exhaust fan EF-3 is started by electric room thermostat T-1 whenever the temperature in the mechanical room exceeds 85°F.

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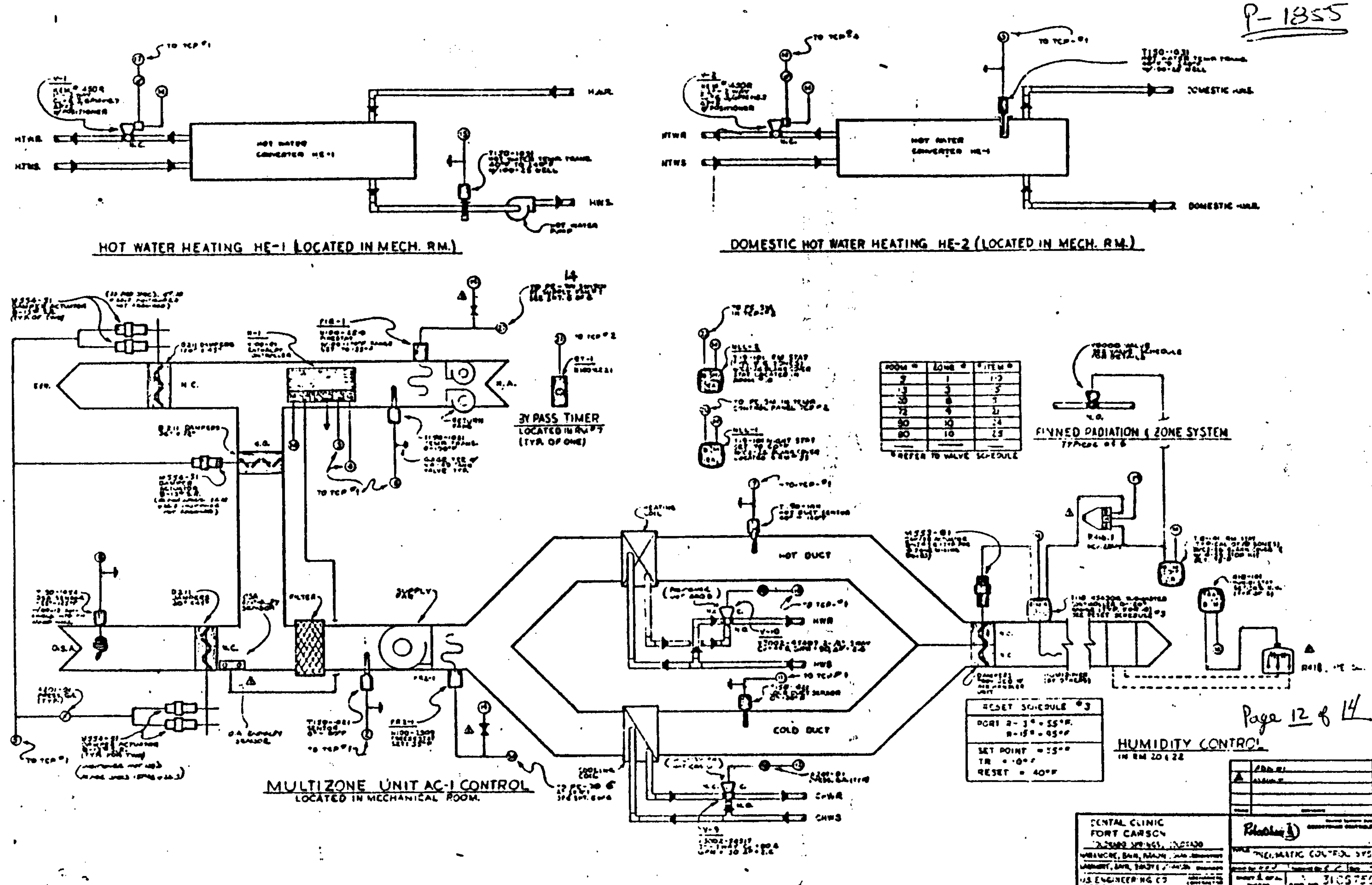

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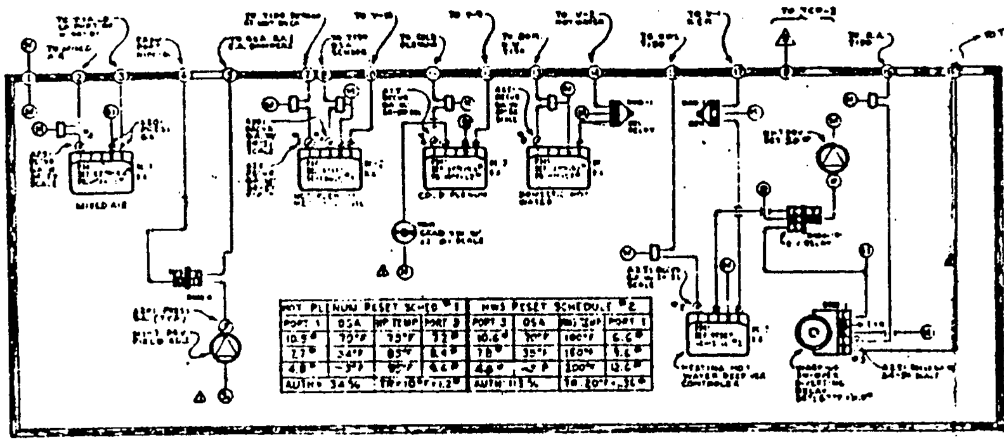
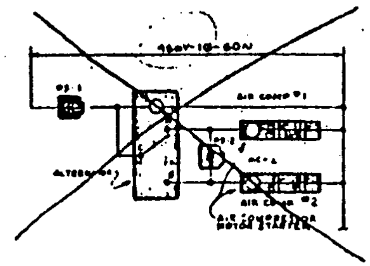


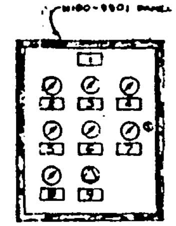
HOT PLENUM RESET SCHED #1				HWS RESET SCHEDULE #2			
PORT 1	OSA	HP TEMP	PORT 3	PORT 3	OSA	HWS TEMP	PORT 1
10.5#	70°F	75°F	3.2#	10.6#	70°F	100°F	6.6#
7.7#	34°F	85°F	6.4#	7.8#	35°F	150°F	9.6#
4.8#	-3°F	95°F	8.6#	4.8#	-3°F	200°F	12.6#
AUTH 34%	[illegible]			AUTH 113%	[illegible]		

TEMPERATURE CONTROL PANEL TCP-1
(1 REQ'D, LOCATED IN MECHANICAL ROOM)



COMPRESSOR WIRING DIAGRAM
LOCATED IN MECH. ROOM (TYP FOR 1)

See separate drawing for compressor wiring.



NAMEPLATES ☐:

1. TCP - #1
2. OUTSIDE AIR TEMP.
3. RETURN AIR TEMP.
4. MIXED AIR TEMP.
5. HOT PLENUM TEMP.
6. COLD PLENUM TEMP.
7. HEATING HOT WATER TEMP.
8. DOMESTIC HOT WATER TEMP.
9. LOWEP-HIGHER COLD DECK RESET

NOTE:
ALL ABOVE PLATES TO BE BLACK LAMACOID.

TEMPERATURE CONTROL PANEL TCP-1

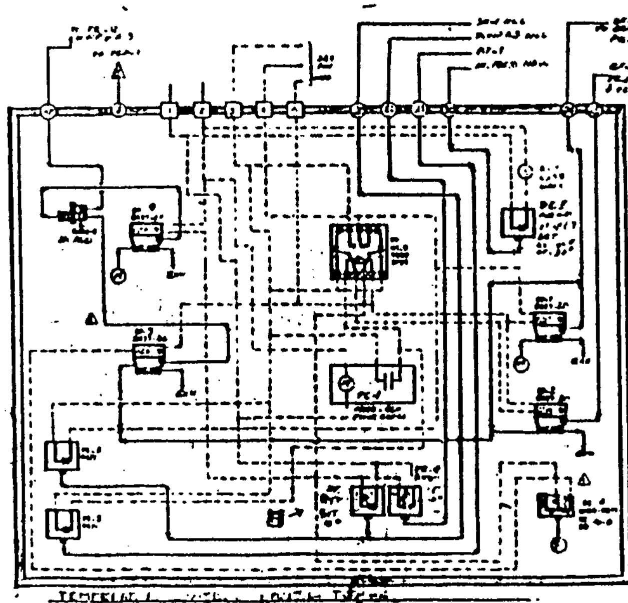
GENERAL NOTES:

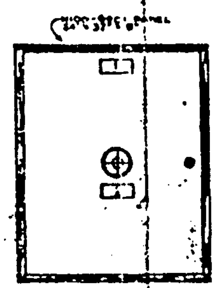
1. ALL SHADED ITEMS FURNISHED BY R.C.C.
2. PREWIRED PANELS & CABINETS FURNISHED BY R.C.C.
3. ZONE MIX BOXES & HUMIDIFIERS FURNISHED BY OTHERS
4. ALL PNEUMATIC LINES OUTSIDE OF PANEL TO BE H.B. COPPER
5. TUBING INSIDE PANELS TO BE F.R. POLYETHYLENE
6. INDICATES PNEUMATIC LINES
7. INDICATES PREWIRED CONTROL PANEL—WIRING BY R.C.C.
8. INDICATES FIELD WIRING BY R.C.C.
9. INDICATES WIRING BY OTHERS

HOT WATER PUMP AS ON WHEN

1) [illegible]

2) [illegible]

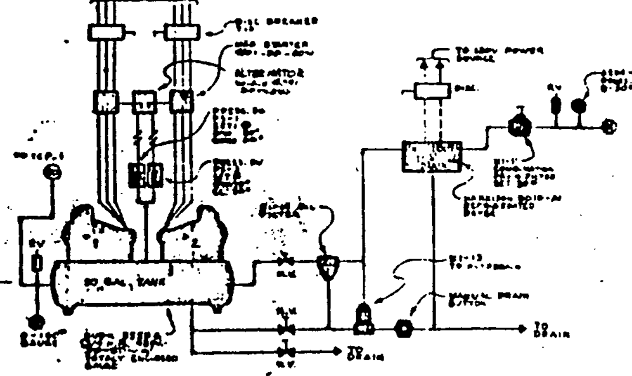




TEMP. CONTROL PANEL TCP-2

NAMEPLATES ☐:

1. TCP #2
2. AIR COMPRESSOR OVER-PRESSURE ALARM



AIR CONTROL STATION
(COMPRESSOR-ALTERNATOR DETAIL)

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DENTAL CLINIC
FORT CARSON
COLORADO

AS ENGINEERING CO.

TEMP. & PNEUMATIC CONTROL

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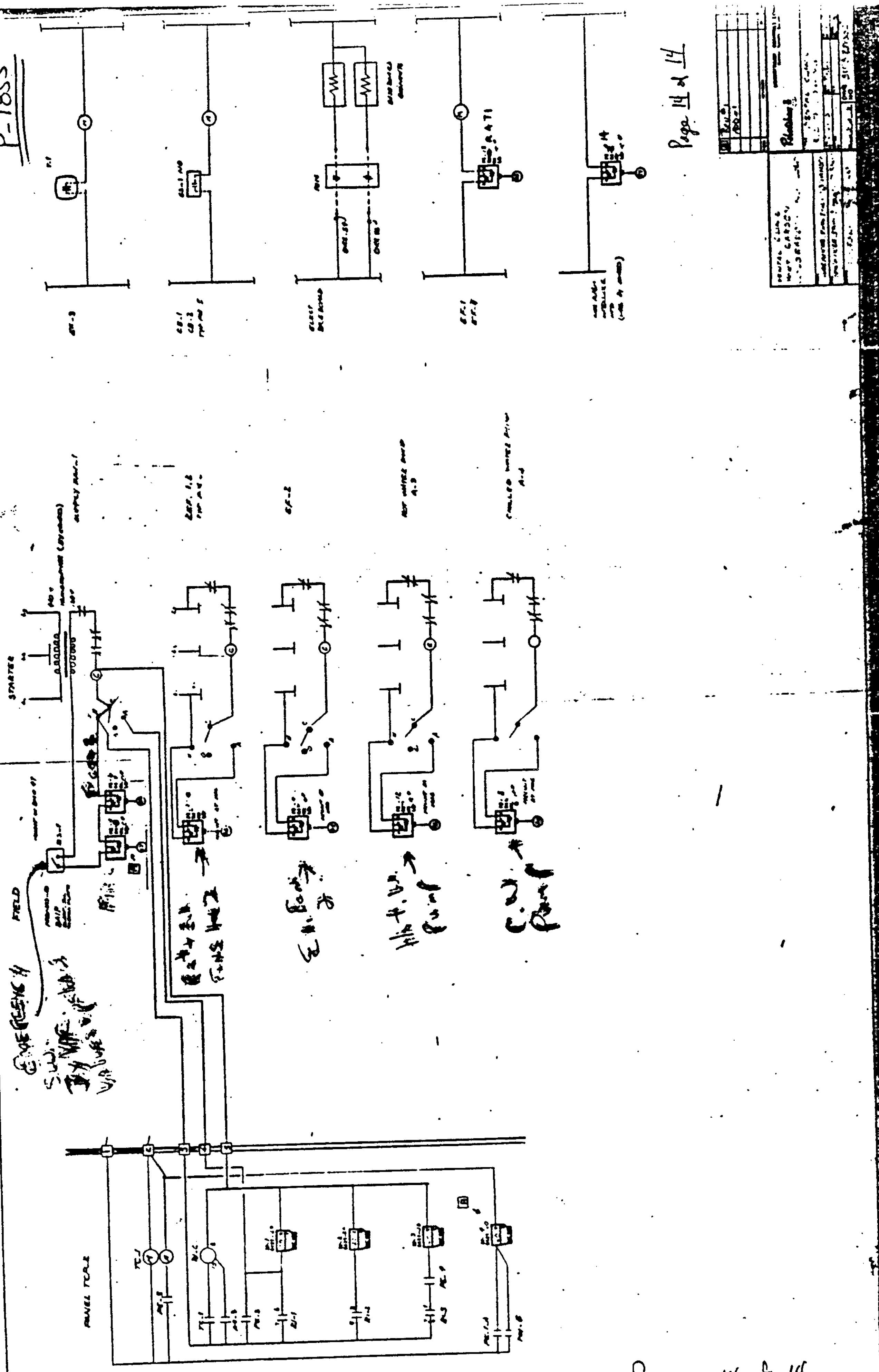
P-1855



P-1855

*** FMEA SURVEY OBSERVATIONS ***

9/92
AJN/JOE

GENERAL BUILDING DATA

BLDG #: 1864 BLDG NAME: CENTRAL COOLING PLANT JOB #: 124
SURVEYED BY: TEAM 1 DATE: ~~12/18/85~~ BLDG CONTACT: NELS MOATS
CONTACT TELEPHONE NUMBER: 579-5227 BLDG USAGE: CHILLER PLANT
TOT BLDG AREA: 6968.0 SF # OF FLOORS: 2 # OF PEOPLE: 1

BUILDING OCCUPANCY: MON - FRI: 0600 TO 1800 FIRST SHIFT: _____
SATURDAY: " TO " SECND SHIFT: _____
SUNDAY: " TO " THIRD SHIFT: _____
HOLIDAYS: " TO " HOLIDAYS: _____

0600 - 2000 May-Sept. (7 days per week)
0700 - 1530 Sept.-May (7 days per week)

ENVIRONMENTAL CONDITIONS:

	HEATING SETPOINTS				COOLING SETPOINTS			
	WEEKDAYS		WEEKENDS		WEEKDAYS		WEEKENDS	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
PRESENT T'STAT:	76°	76°	76°	76°				
REQUIRED T'STAT:	55°	55°	55°	55°				

THERMOSTAT LOCATION(S): ____
HUMIDIFICATION REQUIREMENTS (RH): ____ H'STAT LOCATION(S): ____

LIGHTING:

	AREA(SF)	LAMP TYPE	#LMPS	W/SF	SCHEDULE ON	SCHEDULE OFF
1)	6968	FL	113	1.05		
2)						
3)						
4)						

DATA SOURCE: X OBSERVATION ___ASHRAE ___OTHER
SEE ATTACHED SCHEDULE? X Y ___N

ELECTRIC EQUIPMENT:

	AREA(SF)	TYPE	(KW)	W/SF	SCHEDULE ON	SCHEDULE OFF
1)	6968	MISC KITCHEN EQUIP	NEGLIGIBLE			
2)						
3)						
4)						

DATA SOURCE: X OBSERVATION ___ASHRAE ___OTHER
SEE ATTACHED SCHEDULE? ___Y ___N

INTERNAL MASS: MATERIAL: HEAVY EQUIPMENT ESTIMATED MASS: M (L, M, H)

INFILTRATION: LOCATION(S): WINDOWS, OH DOORS

ESTIMATED RATE: ___(L, M, H) or
___AIR CHANGES or
___CFM/LIN FT CRACK

691 ACFM

*** FMEA SURVEY OBSERVATIONS ***

GENERAL BUILDING DATA

CONSTRUCTION:

WALLS:

	CONSTRUCTION COMPONENT	WIDTH	HEIGHT	AREA (SF)	U-VALUE
NE ~~N:~~				1744	0.304
SE ~~S:~~				3048	0.253
SW ~~E:~~				2010	0.171
NW ~~W:~~				3064	0.305

ROOFS:

CONSTRUCTION COMPONENT	WIDTH	HEIGHT	AREA (SF)	U-VALUE
BUR/INS/MTL DK			6968	.164

WINDOWS:

	AREA (SF)	~~TYPE~~ U-FACTOR	SP	DP	DRAPES
NE ~~N:~~	266		X		
SE ~~S:~~	72				
~~E:~~					
~~W:~~					

FLOOR TYPE: ___ SLAB ___ CRAWL SPACE X BASEMENT ___ OTHER*

AREA: 6968 SF

PERIMETER: 684 LF INSULATION? ___Y___N ___IN ___________

SPECIAL AREAS: ________________

ADDITIONAL NOTES: BUILDING HEAT SUPPLIED BY MTW FROM BOILER PLANT NEXT DOOR. THE BUILDING IS NOT COOLED.

FILM #: ________ FRAME #: ________________

SKETCHES:

* Specify in "Additional Notes"

Bldg No.: 1864

__FMEA_SURVEY_OBSERVATIONS__

GENERAL_BUILDING_DATA

LIGHTING SCHEDULE

Page ___of___

AREA: (A)MAIN_6968____SF (B)MEZZ______________SF
(A) _________X_________ (B) _________X_________

DATA SOURCE:___DRAWINGS ___SURVEY TOUR

Mark	#lamps	W/Fix	#Fix	Flr #	Comments
	32	253	16	UP	MACHINE ROOM
	4	71	2	UP	KITCHEN
	2	71	1	UP	TOILET
	1	35	1	UP	TOILET
	4	137	4	UP	OFFICE
	70	71	35	DN	PUMP ROOM

(A)TOTAL: _____7329___Watts/________6968___SF=_1.05_ W/SF

(B)TOTAL: ________________Watts/__________________SF=________ W/SF

ADDITIONAL NOTES: WATTAGE HAS BEEN ADJUSTED ON BCEP FORM TO ACCOUNT FOR SCHEDULING.

*** FMEA SURVEY OBSERVATIONS ***

GENERAL BUILDING DATA

MISCELLANEOUS BASE LOADS:

DOMESTIC HOT WATER:

MANUFACTURER & MODEL RHEEM STANDARD

FUEL SOURCE ___ NAT GAS X ELEC ___ OIL ___ STM GEN ___ OTHER*

SUPPLY TEMPERATURE 136 °F, DISTANCE FROM HEATER 10 FT

INPUT 7 RECOVERY RATE ______ OPERATING SCHEDULE ______

EXTERIOR LIGHTING:

TYPE ______ NO ___ SCHEDULE ______ CONTROL ______

TYPE ______ NO ___ SCHEDULE ______ CONTROL ______

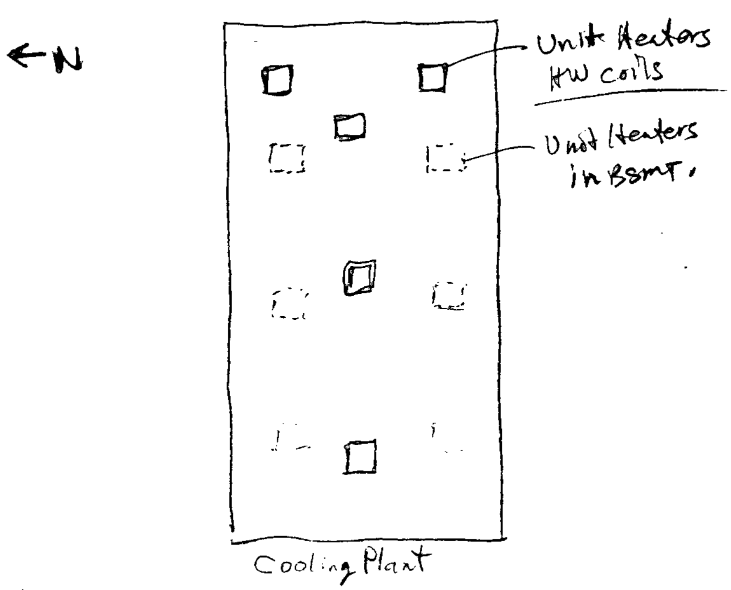
TOTAL KW ______

FUNCTION OF LIGHTS ___ SECURITY ___ PARKING LOT ___ ENTRY ___ OTHER*

ADDITIONAL COMMENTS: ______

FILM #: ______ FRAME #: ______

ADDITIONAL SKETCHES:



Honeywell Pneumatic controller set at 250°F

T-STATS all set at 60°F

H-O-A switch appears to have Auto control of HW pump

HW valve interlocked with HW pump so when pump OFF, Valve closes; & Vice/Versus

* Specify in "Additional Comments"

__FMEA_SURVEY_OBSERVATIONS__

MECHANICAL_EQUIPMENT_DATA

UNITARY HEATING EQUIPMENT:

UNIT NO.	TYPE	OUTPUT CAPACITY	HEATING SOURCE	CFM	HP	STARTER & CONTROL	SETPOINT
UH1→5	FC	UNAVAIL	MTW	UNAVAIL	~1/3	LVT	76°

FILM #: _______ FRAME #: ____________________

NOTES: TYPE --> unit heater, unit ventilator, duct furnace, wall furnace. etc.
HEATING SOURCE --> electric, gas fired, oil, steam, hot water, etc.
STARTER & CONTROL --> momentary, maintained, line v stat, 24 v stat, self contained, etc.

Bldg No.: 1864

GENERAL ENERGY CONSERVATION OPPORTUNITY CHECKLIST

Bldg Name: Chiller Plant Bldg #: P-1864 Contact: ________ Phone #: ________ Surveyed By: PJK Date: ________

ECO TITLE	ANNEX A	DATE	ANNEX B	DATE	COMMENTS
INSULATION	A1		# B01	✓	on Block walls
STORM WINDOWS or DOUBLE GLAZING	A2		# B02	✓	All windows
WEATHER STRIPPING and CAULKING	A3		# B03	✓	Doors, windows exh. louvers.
INSULATED PANELS	A4		# B04	✓	All Windows
VESTIBULES or REVOLVING DOORS	A5		# B05		N/A – Traffic B low
LOAD DOCK SEALS (Strip Door or Air Cu)	A6		B06		N/A
REDUCTION of GLASS AREA	A7		B07		N/A
REPLACE KITCHEN LIGHT FIXTURES	A8		# B08		N/A
SHUTDOWN DHW or MOD CTRLS (Non FH)	A9		B09	✓	Reduce temp. to 105 °F
REDUCE LIGHTING LEVELS	A10		# B11		N/A
REPLACE INCANDESCENT LIGHTING	A11		# B12		N/A
USE MORE EFFICIENT LIGHTING SOURCE	A12		# B10		N/A HPS
HIGH EFFICIENCY MOTOR REPLACEMENT	A13		B13		N/A
NIGHT SETBACK/SETUP THERMOSTATS *	A14		# B14	✓	install HW. valve on UHs also 68/55
INFRARED HTRS (Motor Rep Shops & Whse)	A15		# B15		N/A
ECONOMIZER CYCLES (Dry Bulb Type)	A16		# B16		N/A
CONTROL HOT WATER CIRC PUMP *	A17		# B17		N/A
FM RADIO CONTROLS	A18		B18		—
RADIATOR CONTROLS	A19		B19		N/A
DECENTRALIZE DHW HTRS (POU Htrs) *	A20		B		N/A
HEAT RECLAIM from HOT REFRIG GAS	A21		# B20		N/A
REDUCE AIR FLOW *	A22		# B21		N/A
PREVENT AIR STRATIFICATION *	A23		# B22		N/A (UH accomplish this?)
INSTALL TIME CLOCKS	A24		B23		N/A
CHILLER REPLACEMENT	A25		B		N/A
REPLACE ABSORPTION CHILLER	A26		B38		N/A – Process equipment.
INSULATE STEAM LINES	A27		B26		N/A
RETURN CONDENSATE	A28		B27		N/A
TRANSFORMER OVERVOLTAGE	A29		B31		?
TRANSFORMER LOADING	A30		B30		?
REVISE OR REPAIR HVAC CONTROLS	A31		B32		N/A
WASTE HEAT RECOVERY *	A32		B33		N/A
ADD ADDITIONAL LIGHT SWITCHES	A33		B35		N/A
HVAC INIT/BLDGS WITH SEPARATE BOILERS	A34		# B37		N/A
STANDARD SOLUTIONS for EXT LIGHTS	A35		# B36		N/A
BOILER OXYGEN TRIM CONTROLS	A		B24		N/A
REVISE BOILER CONTROLS	A		B25		N/A
PRE-HEAT DHW	A		B28		N/A
HEAT PUMPS	A		# B29		N/A
EMCS	A		B39	✓	
HOT WATER RECIRC PUMPS	A		M40,17		
HPS STREET LIGHTS	A		M41		
ELECTRIC OUTLET INSULATION	A		M42		

<*> Denotes ECO's studied by Burns & McDonnel
<#> Denotes ECO's common to Military Family Housing

*** FMEA SURVEY OBSERVATIONS ***

9/9/92
AJN/JOE

GENERAL BUILDING DATA

BLDG #: P-1955 BLDG NAME: SERVICE MODULE JOB #: 124
SURVEYED BY: Team 1 DATE: ~~10-22-84~~ BLDG CONTACT: Supervisor
CONTACT TELEPHONE NUMBER: ex: 2367 BLDG USAGE: Recruiting
TOT BLDG AREA: 2,060 SF # OF FLOORS: ____ # OF PEOPLE: 2
✓ Note: Drawings show 1,995 SF

BUILDING OCCUPANCY:

MON - FRI:	0700	TO	1630	FIRST SHIFT:	
SATURDAY:		TO		SECND SHIFT:	
SUNDAY:		TO		THIRD SHIFT:	
HOLIDAYS:		TO		HOLIDAYS:	

ENVIRONMENTAL CONDITIONS:

	HEATING SETPOINTS				COOLING SETPOINTS			
	WEEKDAYS		WEEKENDS		WEEKDAYS		WEEKENDS	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
✓ PRESENT T'STAT:	72	72	72	72	72	—	72	—
REQUIRED T'STAT:	68	55	55	55	78	—	—	—

THERMOSTAT LOCATION(S): Game Room
HUMIDIFICATION REQUIREMENTS (RH): — H'STAT LOCATION(S): —

LIGHTING:

	AREA(SF)	LAMP TYPE	#LMPS	W/SF	SCHEDULE	
1)	2,060	fluorescent and incandescent		1.07	ON	OFF
2)					ON	OFF
3)					ON	OFF
4)					ON	OFF

DATA SOURCE: ___OBSERVATION ___ASHRAE X OTHER
SEE ATTACHED SCHEDULE? X Y ___N See page 3 (Est 10% on at night)

✓ ELECTRIC EQUIPMENT:

	AREA(SF)	TYPE	(KW)	W/SF	SCHEDULE	
1)	2,060	Est .25 w/SF			ON	OFF
2)					ON	OFF
3)					ON	OFF
4)					ON	OFF

DATA SOURCE: X OBSERVATION ___ASHRAE ___OTHER
SEE ATTACHED SCHEDULE? ___Y ___N (Est. 5% on at night)

✓ INTERNAL MASS: MATERIAL: conc block ESTIMATED MASS: (L, M, H)

✓ INFILTRATION: LOCATION(S): None when fan is running. The building is pressurized by the fan system.

ESTIMATED RATE: _____(L, M, H) or
_____AIR CHANGES or
_____CFM/LIN FT CRACK

Building Volume = 15,960 CF

Assume No infiltration due to pressurization

Bldg No.: P-1955

***** FMEA SURVEY OBSERVATIONS *****

GENERAL BUILDING DATA

CONSTRUCTION:

✓WALLS:

	CONSTRUCTION COMPONENT	WIDTH	HEIGHT	NET AREA(SF)	U-VALUE
NE ~~N~~:	4" Face brick, Airspace,	46.33	12	483	0.10
SE ~~E~~:	2" rigid insulation, 6"	46.33/12.7	12/8	657.33	0.10
SW ~~E~~:	Concrete block ↓	46.33	12	483	0.10
NW ~~W~~:	↓	46.33/12.7	12/8	589.83	0.10

ROOFS:

CONSTRUCTION COMPONENT	WIDTH	HEIGHT	AREA(SF)	U-VALUE
Builtup Roof, 3" Rigid			1995	0.086
insulation, Airspace, Acoustic				
Tile				
3in Batt insul. added to ceiling =				0.091
				TOT. U = 0.044

✓WINDOWS:

	AREA(SF)	TYPE	SF	DF	DRAPES
NE ~~N~~:	73 (*)	Aluminum, fixed frame	X		
SE ~~E~~:	∅	↓			
SW ~~E~~:	73 (**)	↓	X		
NW ~~W~~:	67.5 (***)	↓	X		

U=1.18

✓FLOOR TYPE: X SLAB ___ CRAWL SPACE ___ BASEMENT ___ OTHER*

AREA: 1995 SF

PERIMETER: 211 LF INSULATION? X Y ___ N 2 IN rigid insulation

SPECIAL AREAS: ______

ADDITIONAL NOTES: Approx. 1/2 of the windows are plexi-glass. Caulking is in poor condition around all windows. The space thermostat is set to 85°F but the space temperature reads approx 72°F.

FILM #: ________ FRAME #: ________

SKETCHES:

(*) $(1)(10) + (1)(3) + (2)(30) = 73$ SF

(**) $(1)(10) + (1)(3) + (2)(30) = 73$ SF

(***) $(3)(22.5) = 67.5$

* Specify in "Additional Notes"

Bldg No.: P-1955

***** FMEA SURVEY OBSERVATIONS *****

GENERAL BUILDING DATA

LIGHTING SCHEDULE

Page ___ of ___

AREA: (A) MAIN ____________ SF (B) MEZZ ____________ SF
(A) ________ X ________ (B) ________ X ________

DATA SOURCE: ___ DRAWINGS ___ SURVEY TOUR

Mark	#lamps	W/Fix	#Fix	Flr #	Comments
M4	1	30	6		180 watts (Recessed incand)
J/8	4	180	8		1,440 watts (Recessed fluor)
J-1/4	2	90	3		270 watts (" ")
E-1/2	1	10	2		20 watts (exit sign)
G/2	1	150	2		300 watts (Vaportite incand)
	1	60	16		960 w (Recessed incand)
	1	60	2		120 w (Incandescent)
	4	172	10		1720 w (Recessed fluor)
	1	47	3		141 w (Fluorescent)
	1	10	2		20 w (exit sign)
					2961. w TOTAL / 2060 SF = 1.44 w/SF
					(Typical for P1956, P-2055, P-2056, P-2155, & P-2156

(A) TOTAL: 2210 Watts/ 2060 SF= 1.07 W/SF

(B) TOTAL: ________ Watts/ ________ SF= ________ W/SF

ADDITIONAL NOTES:

Bldg No.: P-1955

*** FMEA SURVEY OBSERVATIONS ***

GENERAL BUILDING DATA

MISCELLANEOUS BASE LOADS:
DOMESTIC HOT WATER:
MANUFACTURER & MODEL ___NONE________________________________
FUEL SOURCE ___ NAT GAS ___ ELEC ___ OIL ___ STM GEN ___OTHER*
SUPPLY TEMPERATURE ______°F, DISTANCE FROM HEATER _____FT
INPUT ______ RECOVERY RATE _______ OPERATING SCHEDULE __________

EXTERIOR LIGHTING:
TYPE __INC________ NO 4__ SCHEDULE _100 watts(ea) CONTROL _hand___
TYPE _____________ NO ___ SCHEDULE __24 hours_ CONTROL _________
TOTAL ~~KW~~ __400 watts
FUNCTION OF LIGHTS ___ SECURITY ___ PARKING LOT X ENTRY
___ OTHER*

ADDITIONAL COMMENTS: ____

FILM #: ______ FRAME #: ____

ADDITIONAL SKETCHES:

* Specify in "Additional Comments"

Bldg No.: __P-1955_____

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

✓AIR HANDLING UNITS:
MANUFACTURER ________TRANE________ MODEL No. #6 Climate Changer
AHU NUMBER: _____ AHU TYPE: HORIZONTAL Draw Thru
LOCATION: ___MER_____________ SPACE SERVED: _____All_____________

✓FAN DATA:
SUPPLY FAN HP: 1½ (est) SUPPLY CFM: 3225 STATIC PRESS: 1.5
RETURN FAN HP: ___ RETURN CFM: _____ STATIC PRESS: ___
EXHAUST FAN HP: ___ EXHAUST CFM: ____ STATIC PRESS: ___
MOTOR STARTER: MNT __ MOM __. SWITCH: P.B. __ H.O.A. __ DISCON __

✓COILS:
HEATING: HW X STM __ DIRECT FIRED --> NG __ OIL __ ELC__ OTHER __
COOLING: CW X DX __. FROM CHILLER _________, FROM DX UNIT _______
REHEAT: # OF COILS ___ TYPE _____. RECOOL: # OF COILS ___ TYPE ___
HUMIDITY: STM __ SPRAY __ ELC __. HW/CW COIL VALVES: 2 WAY __, 3 WAY __

✓DAMPERS:
O.A. DAMPER: __ (Y, N), IF YES, FIXED __%, MODULATING 20% TO 80%
R.A. DAMPER: __ (Y, N), IF YES, FIXED __%, MODULATING 20% TO 80%
E.A. DAMPER: __ (Y, N), IF YES, FIXED __%, MODULATING __% TO __%
ECONOMIZER: __ (Y, N), IF YES, OA __ RA __ ENTHALPY __
OA LEAKAGE: __20__% IF NO, CAN ECONOMIZER BE ADDED __yes (See sequence of operation)

✓FILTER CONDITION: ___GOOD X FAIR ___POOR

✓SYSTEM OPERATION:

	MON - FRI	SAT	SUN
*PRESENT OPERATION:	CONTINUOUS	_____ TO _____	_____ TO _____
*REQUIRED OPERATION:	~~_____ TO _____~~	_____ TO _____	_____ TO _____

	HEATING SETPOINTS WEEKDAYS DAY	NIGHT	WEEKENDS DAY	NIGHT	COOLING SETPOINTS WEEKDAYS DAY	NIGHT	WEEKENDS DAY	NIGHT
*PRESENT TEMP:								
*REQUIRED TMP:								

HUMIDIFICATION REQUIREMENTS (RH): ____ HUMIDISTAT LOCATION: _____

✓SYSTEM SETPOINTS: MIXED AIR 60 °F, HOT DECK ___ °F, COLD DECK ___ °F
TIME CLOCK: N (Y, N), IF YES, IS IT OPERATIONAL ___ (Y, N)

✓CONTROLS: PNEUMATIC ______, ELECTRIC __X__, PNEUMATIC/ELEC ______

EQUIPMENT CONDITION: EXCELLENT(E), GOOD(G), POOR(P) T'STAT ___
H'STAT ___ COMPR ___ DAMPERS ___ LINKAGES ___ FANS ___ SHEAVES ___
VALVES ___ ACTUATORS ___ BELTS ___ MIXING BOX ___
OTHER___

See note Next page!

COMMENTS: ~~The air handler is in poor condition. The sheet metal box is severly damaged and is drawing 100% OA through OA damper due to malfunctioning controls. This pressurizes the bldg and consumes more energy than necessary.~~

Bldg No.: P-1955

*** FMEA SURVEY OBSERVATIONS ***

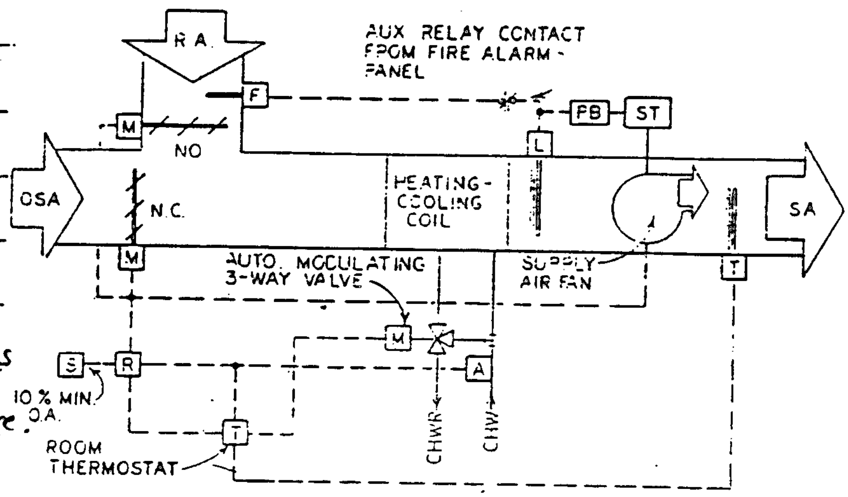
MECHANICAL EQUIPMENT DATA

AIR HANDLING UNITS:
CONTROL STRATEGY: ~~Most of the conditioned air is dumped into the mechanical room while the~~ remainder pressurizes the building.

* NOTE: Site investigation on 1-30-85 shows unit operating correctly and the AHU box is repaired. The unit continues to

ADDITIONAL AHU/SYSTEM COMMENTS: pressurize the building to a slight degree.

✓ The Air handler coil is supplied hot water and chilled water from the main plants. HW/CW circulation pump is 1/3 hp. Bldg occupants turn fan OFF as needed to control space temperature.



DRAW-THROUGH UNIT CONTROL DIAGRAM
NOT TO SCALE

FILM #:_______ FRAME #:_____

SYSTEM SKETCH:

✓ DRAW-THROUGH UNIT SEQUENCE OF CONTROL: AHU FAN SHALL BE STARTED MANUALLY AND SHALL RUN CONTINUOUSLY UNLESS RETURN AIR TEMPERATURE AT FIRESWITCH EXCEEDS 125° F OR COIL DISCHARGE TEMPERATURE IS BELOW 38° F. OUTSIDE AIR DAMPER CLOSES WHEN AHU FAN IS DE-ENERGIZED. WHEN AN AQUASTAT STRAPPED TO THE CHILLED-HOT SUPPLY LINE TO THE COIL SENSES HEATING WATER, THE ROOM THERMOSTAT MODULATES THE AUTOMATIC THREE-WAY VALVE AND THE OUTSIDE AND RETURN AIR DAMPERS IN SEQUENCE TO MAINTAIN TEMPERATURE. A LOW LIMIT THERMOSTAT IN AHU DISCHARGE SHALL OVERRIDE ROOM THERMOSTAT TO CLOSE OUTSIDE AIR DAMPER AND OPEN 3-WAY VALVE IF DISCHARGE AIR FALLS BELOW 50° F. WHEN THE AQUASTAT SENSES THE PRESENCE OF CHILLED WATER IN THE SUPPLY LINE TO THE COIL, THE OUTSIDE AIR DAMPER GOES TO MINIMUM POSITION AND THE ROOM THERMOSTAT MODULATES THE AUTOMATIC 3-WAY VALVE TO MAINTAIN TEMPERATURE IN THE SPACE.

**** FMEA SIMILAR BUILDINGS SURVEY FORM ****

9/92 AJN

GEN BUILDING DATA

BLDG #: 1956(P) BLDG NAME: Det Day Room DATE: ~~2-13-85~~ JOB #: 124
SURVEYED BY: ~~DD/AM~~ BLDG CONTACT: TELEPHONE EXT:
BLDG USE: Recreation # FLOORS: 1 # PEOPLE: 20 BLDG AREA: 2000 SF

BLDG OCCUPANCY: S M T W Th F S 0600 TO 1630
S M T W Th F S ____ TO ____

T'STAT SETTING: HTG: 72 / — AUTO SETBACK: N / Y: — / —
CLG: 75 / —
Temperature,Future,inside,Occupied: 65/78 Temp Present: 72
Temperature,Future,inside,Unoccupied: 55/— AirChange/hR: 0

ARCHITECTURAL

	AREA	U-value	UA
WALL	2212	.10	221
GLASS	214	1.176	252
ROOF	1995	0.044 ~~.088~~	176
FLOOR	181.55	.860	156.13
SUM			805.13

Avg. Floor-Ceiling Height: 8' Floor type: Slab Insulated: Y/N
Window frame type: Alum Wood Operable sections: Y / N
Win size: 2' x 15 SP DP CURT Infiltration L M H
Entry doors: 2 # OH Doors: 0 % of Area Conditioned: 100

LIGHTING: Type: Fluorescent Watts/SF: 1.44 ~~.57~~ Util Frac:

ELECTRICAL EQUIP: office KW/Unit: #Units: Util Frac:

DHW: TYPE: NG/ELEC/CONV Supply Temp: GAL/Person-Day:
AFUE: %

MECHANICAL

	HEATING	COOLING
Primary System:	HTHW → HW Conv	CHW
Fuel:	NaG (CP)	NaG (CP)
Capacity:	109 KBTUH	
est.Peak Del.Effic:	63.1%	52.12%
Months ON:	8	4
Hours ON:	5808	2952
AHUs Hp:	~~1.5~~ 1.0	~~1.5~~ 1.0
cfm:	3225	3225
Min OA:	20%	20%
Economizer:	→	Dumb

MISC:
3 in. batt insul. added to ceiling.
HW/CW pump = 1/2 HP
O.A. reset control on pump = High 65°F; Low 57°F

**** FMEA SIMILAR BUILDINGS SURVEY FORM ****

9/92 AJN/JOE

GENERAL BUILDING DATA

BLDG #: 2055 (P) BLDG NAME: Day Room/Admin DATE: ~~2-13-85~~ JOB #: 124
SURVEYED BY: ~~RK/RT~~ BLDG CONTACT: ________ TELEPHONE EXT: ________
BLDG USE: Admin # FLOORS: 1 # PEOPLE: 6 BLDG AREA: 2060 SF

BLDG OCCUPANCY: S M T W Th F S 0600 TO 1630
S M T W Th F S ____ TO ____

T'STAT SETTING: HTG: ___/___ CLG: ___/___ AUTO SETBACK: N / Y: ___/___
Temperature,Future,inside,Occupied: 65/78 Temp Present: 72
Temperature,Future,inside,Unoccupied: 55/– AirChange/hR: 0

ARCHITECTURAL

	AREA	U-value	UA
WALL	2212	.10	221
GLASS	214	1.176	252
ROOF	1995	0.044 ~~.088~~	176
FLOOR	1995	.86	1716
SUM			2365

Avg. Floor-Ceiling Height: 8' Floor type: Slab Insulated: Y/N
Window frame type: Alum Wood Operable sections: Y / N
Window size: 2' x 15' SP DP CURT Infiltration L M H
Entry doors: 2 # OH Doors: 0 % of Area Conditioned: 100

LIGHTING: Type: Fluorescent Watts/SF: 1.44 ~~.57~~ Util Frac: ____
ELECTRICAL EQUIP: Office KW/Unit: ____ #Units: ____ Util Frac: ____

DHW: TYPE: NG/ELEC/CONV Supply Temp: ____ GAL/Person-Day: ____
AFUE: ____ %

MECHANICAL

	HEATING	COOLING
Primary System:	HTHW → HW Conv	CHW
Fuel:	NaG (CP)	NaG (CP)
Capacity:	109 KBTUH	
est.Peak Del.Effic:	63.1%	52.12%
Months ON:	8	4
Hours ON:	5808	2957
AHUs Hp:	1.5	1.5
cfm:	3225	3225
Min OA:	20%	20%
Economizer: yes	→	Dumb

O.A./R.A damper motor modulates
Low limit set at 40°F
High limit set at 80°F

MISC:

3 in. batt insul. added to ceiling.
HW/CW pump = ½ HP
O.A. reset on pump = High 65°F ; Low 50°F

**** FMEA SIMILAR BUILDINGS SURVEY FORM ****

9/92 AJN

GE... L BUILDING DATA

BLDG #: 2056(P) BLDG NAME: DayRoom/Admin DATE: ~~2-13-85~~ JOB #: 124
SURVEYED BY: PK/RT BLDG CONTACT: ______ TELEPHONE EXT: ______
BLDG USE: Admin # FLOORS: 1 # PEOPLE: 6 BLDG AREA: 2060 SF

BLDG OCCUPANCY: S M T W Th F S 0600 TO 1630
S M T W Th F S ______ TO ______

T'STAT SETTING: HTG: ___/___ AUTO SETBACK: N / Y: ___/___
CLG: ___/___
Temperature,Future,inside,Occupied: 65/78 Temp Present: 72
Temperature,Future,inside,Unoccupied: 55/— AirChange/hR: 0

ARCHITECTURAL

	AREA	U-value	UA
WALL	2212	.10	221
GLASS	214	1.176	252
ROOF	1995	0.044 ~~.086~~	176
FLOOR	1995	.86	1716
SUM			2365

Avg. Floor-Ceiling Height: 8' Floor type: Slab Insulated: Y/N
Window frame type: Alum Wood Operable sections: Y / N
Win... size: 2' x 15 SP DP CURT Infiltration L M H
...y doors: 2 # OH Doors: 0 % of Area Conditioned: 100

LIGHTING: Type: Fluorescent Watts/SF: 1.44 ~~.51~~ Util Frac: ______

ELECTRICAL EQUIP: Office KW/Unit: ______ #Units: ___ Util Frac: ______

DHW: TYPE: NG/ELEC/CONV Supply Temp: ______ GAL/Person-Day: ______
AFUE: ______ %

MECHANICAL

	HEATING	COOLING
Primary System:	HTHW → HW Conv	CHW
Fuel:	NaG (CP)	NaG (CP)
Capacity:	109 KBTUH	
est.Peak Del.Effic:	63.1%	52.12%
Months ON:	8	4
Hours ON:	5808	2952
AHUs Hp:	1.5	1.5
cfm:	3225	3225
Min OA:	20%	20%
Economizer:	→	Dumb

MISC:

3in. batt insul. added to ceiling
HW/CW pump = 1/3 HP
O.A. reset on pump = High 65°F; Low 65°F

PAGE 1 of 1

**** FMEA SIMILAR BUILDINGS SURVEY FORM ****

9/92 AJN/JOE

GEN L BUILDING DATA

BLDG #: 2155(P) BLDG NAME: Day Room/EM Club DATE: ~~2-13-88~~ JOB #: 124
SURVEYED BY: PK/RT BLDG CONTACT: ______ TELEPHONE EXT: ______
BLDG USE: Recreation # FLOORS: 1 # PEOPLE: ___ BLDG AREA: 2000 SF

BLDG OCCUPANCY: S M T W Th F S 0600 TO 1630
S M T W Th F S ______ TO ______

T'STAT SETTING: HTG: ___/— AUTO SETBACK: N / Y: —/—
CLG: ___/—
Temperature,Future,inside,Occupied: 65/78 Temp Present: 72
Temperature,Future,inside,Unoccupied: 55/— AirChange/hR: 0

ARCHITECTURAL

	AREA	U-value	UA
WALL	2212	.10	221
GLASS	214	1.176	252
ROOF	1995	0.044 ~~.086~~	176
FLOOR	1995	.86	1716
SUM			2365

Avg. Floor-Ceiling Height: 8' Floor type: Slab Insulated: Y/N
Window frame type: Alum Wood Operable sections: Y / N
Win size: 2' x 15' SP DP CURT Infiltration L M H
y doors: 2 # OH Doors: 0 % of Area Conditioned: 100

LIGHTING: Type: Fluorescent Watts/SF: ~~.51~~ 1.44 Util Frac: ____

ELECTRICAL EQUIP: Office KW/Unit: ____ #Units: ____ Util Frac: ____

DHW: TYPE: NG/ELEC/CONV Supply Temp: ____ GAL/Person-Day: ____
AFUE: ____%

MECHANICAL

	HEATING	COOLING
Primary System:	HTHW → HW Conv	CHW
Fuel:	NaG (CP)	NaG (CP)
Capacity:	109 KBTUH	
est.Peak Del.Effic:	63.1%	52.12%
Months ON:	8	4
Hours ON:	5808	2952
AHUs Hp:	1.5	1.5
cfm:	3225	3225
Min OA:	20%	20%
Economizer:	→	Dumb

MISC:

3 in batt insul. added to ceiling
HW/CW pump = 1/3 HP
O.A. reset on pump = High 70°F ; Low 65°F
R.A. damper linkage is disconnected from O.A. damper. Linkage is gone.
R.A. is in a fixed open condition.

PAGE 1 of 1

JOB

SHEET NO. OF

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CALCULATED BY J.O.E. DATE 9/92

CHECKED BY DATE

SCALE

B 2155

AHU - runs cont, (T) controls H/C coil. Hot water temp is on OA reset. HW CV was stroked by changing OA setpoint. COV was stroked by changing OA setpoint. (OA setpoint ~~is~~ for changeover and is 70°F in this building). CHW CV is controlled by CHW temp. CHW CV has setpoint adjustment integral to valve. Changed this setpoint but valve did not move. This ~~possibly~~ would be because since CHW is not cooled at this time the CHW temp. is outside of the range of the CV setpoint adjustment. Diff press. limit on CHW has been disabled. RA damper has been disabled. OA damper motor is connected but we did not see it move.

Of 7 (T)'s: 4 serve E. side, 3 serve west side.
found 6, stroked those 6.
3 are disconnected or linkages dont work.
3 appear to work (actuator moved damper when stroked)
1 does not work (linkage looks OK, but damper didn't move when stroked).

**** FMEA SIMILAR BUILDINGS SURVEY FORM ****

9/92 AJN

GENERAL BUILDING DATA

BLDG #: 2156(P) BLDG NAME: Day Room/Admin DATE: ~~2-13-85~~ JOB #: 124
SURVEYED BY: ~~PK/RT~~ BLDG CONTACT: ______ TELEPHONE EXT: ______
BLDG USE: Admin # FLOORS: 1 # PEOPLE: 6 BLDG AREA: 2060 SF

BLDG OCCUPANCY: S M T W Th F S 0600 TO 1630
S M T W Th F S ______ TO ______

T'STAT SETTING: HTG: ____/— AUTO SETBACK: N / Y: —/—
CLG: ____/—

Temperature,Future,inside,Occupied: 65/78 Temp Present: 72
Temperature,Future,inside,Unoccupied: 55/— AirChange/hR: 0

ARCHITECTURAL

	AREA	U-value	UA
WALL	2212	.10	221
GLASS	214	1.176	252
ROOF	1995	0.044 ~~.088~~	176
FLOOR	1995	.86	1716
SUM			2365

Avg. Floor-Ceiling Height: 8' Floor type: Slab Insulated: Y/N
Window frame type: Alum Wood Operable sections: Y / N
Window size: 2' x 15' SP DP CURT Infiltration L M H
Entry doors: 2 # OH Doors: 0 % of Area Conditioned: 100

LIGHTING: Type: Fluorescent Watts/SF: ~~.57~~ 1.44 Util Frac: ______

ELECTRICAL EQUIP: Office KW/Unit: ____ #Units: ___ Util Frac: ______

DHW: TYPE: NG/ELEC/CONV Supply Temp: ______ GAL/Person-Day: ______
AFUE: ______%

MECHANICAL

	HEATING	COOLING
Primary System:	HTHW → HW Conv	CHW
Fuel:	NaG (CP)	NaG (CP)
Capacity:	109 KBTUH	
est.Peak Del.Effic:	63.1%	52.12%
Months ON:	8	4
Hours ON:	5808	2952
AHUs Hp:	1.5	1.5
cfm:	3225	3225
Min OA:	20%	20%
Economizer:	→	Dumb

MISC:

3 in batt. insul. added to ceiling.
HW/CW pump = 3/4 HP Bell & Gossett
O.A. reset on pump = High 65°F, Low 58°F
Linkage between O.A. & R.A. dampers is missing.
O.A. damper currently open; R.A. damper is fixed in open position.

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JOB: FT CARSON EEAP UPDATE
SHEET NO. 1 OF 4
CALCULATED BY: AJN DATE: 9/92
CHECKED BY: DATE:
SCALE:

MER

BLDG. No.	CW 2-WAY VALVE			HTHW 2-WAY VALVE			3-WAY CHANGEOVER (C.O.) VALVE			O.A. TEMP. RESET ON C.O. VALVE	HW/CW PUMP CONTROLS			COMMENTS
	ACT. TYPE	SIZE (IN.)	STATUS	ACT. TYPE	SIZE (IN.)	STATUS	ACT. TYPE	SIZE (IN.)	STATUS		HIGH (°F)	LOW (°F)	STATUS	
P-1957	D	1.5	DIS	A	½	OP	C	2.0	OP. (leaky)	64	70	60	OP	
P-1958	"	"	OP	"	"	OP	"	"	OP	64	65	58	OP	
P-2057	"	"	No Act.	"	"	UN	"	"	UN	NONE	67	62	OP	
P-2058	"	"	UN	"	"	UN	"	"	UN	NONE	65	55	OP	
P-2157	"	"	DIS	"	"	OP	"	"	OP	90	65	55	OP	
P-2158	"	"	UN	"	"	OP	"	"	FROZEN	90	62	58	OP	
P-2257	"	"	OP	"	"	UN	"	"	OP	70	56	56	OP	HW/CW pump is switched off
P-2258	"	"	UN	"	"	OP	"	"	UN	NONE	HW/CW & HV Pumps controlled by HW reset.			HV units have separate Htg. pump. *
P-2457	"	"	UN	"	"	OP	"	"	UN	NONE		"		"
P-2458	"	"	UN	"	"	OP	"	"	UN	NONE		"		"
P-2557	"	2.0	UN	"	"	OP	"	"	UN	NONE		"		" MTHW Valve Act. disconnected
P-2558	"	2.0	UN	"	"	OP	"	"	UN	NONE		"		" MTHW Valve Act. disconnected

DIS = disconnected UN = unable to verify operation
OP = operable

* 2-way MTHW Valve on return line. 1.5" Valve; Type H Actuator.

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JOB FT CARSON EEAP UPDATE
SHEET NO. 2 OF 4
CALCULATED BY AJN DATE 9/92
CHECKED BY ______ DATE ______
SCALE ______

BLDG. No.	BUILDING SPACE										
	FAN COIL UNITS					HV UNITS					DIS = disconnected INOP = inoperable
	(Typical of 20 per Bldg) 3-WAY COIL VALVE			(Typical of 10 per BLDG.) O.A. DAMPER		(Typical of 5 per Bldg.) 3-WAY COIL VALVE			(Typical of 5 per Bldg) O.A./R.A. DAMPER		
	ACT. TYPE	SIZE (IN.)	STATUS	ACT. TYPE	STATUS	ACT. TYPE	SIZE (IN.)	STATUS	ACT. TYPE	STATUS	COMMENTS
P-1957	H	1/2	9/10 are DIS	G	INOP	H	3 = 1/2 2 = 3/4	2/3 are DIS	B	UN	HVs have pendant mounted T-STATS. 4/5 are broken.
P-1958	"	"	"	"	"	"	"	"	"	"	"
P-2057	"	"	"	"	"	"	"	"	"	"	"
P-2058	"	"	"	"	"	"	"	"	"	"	"
P-2157	"	"	"	"	"	"	"	"	"	"	"
P-2158	"	"	"	"	"	"	"	"	"	"	"
P-2257	"	"	"	"	"	"	"	"	"	"	HVs have utility-type T-STATS w/sensing bulbs.
P-2258	"	"	"	"	"	None-Manual Bal. Vlv.	3/4"	—	"	"	HVs have utility-type T-STATS w/sensing bulbs in R.A. stream.
P-2457	"	"	"	"	"	"	"	—	"	"	"
P-2458	"	"	"	"	"	"	"	—	"	"	"
P-2557	"	"	"	"	"	"	"	—	"	"	"
P-2558	"	"	"	"	"	"	"	—	"	"	"

CALCULATED BY AJN DATE 9/92
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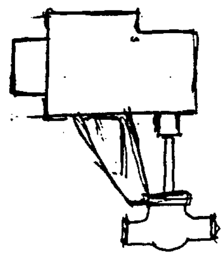
Actuator Types

Type A (HTHW)
Barber-Colman
Valve Operator Mechanism
120V./60Hz./0.5 Amp/28 Watt
MP-461-0-0-1



Type B (HV unit)
Barber-Colman
Valve Operator Mechanism
120V./60Hz./0.5/28 Watt
Part No. MP-471-0-0-1

Type C (c.o.)
MC-421-0-0-1

Type D (cw)
MU-47102-0-0-1

Type E (c.o.)
MC-431-0-0-1
120V, 0.8 Amp, 50 Watt

Type F
MU-47302-0-0-1

Type F1
MP-475-0-0-1

Type F2
MP-481-600-0-1

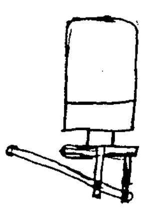
Type F3
MP-485-2-2-1

Type F4
MV-2270-0-0-1

Type F5
MA-418-0-0-2
(120V; 70 watts)

Type F6
MP-470-0-0-1

Type G
Barber-Colman
Hydraulic Actuator
120V./60Hz./0.15 Amps/10 Watt
Part. No. MA-5220



Type H
Barber-Colman
Hydraulic Actuator
120V/60Hz/0.135 Amp/10 Watt
Part No. MP-5210-0-0-1

Type J
MP-5210-0-0-2
120V/60Hz./0.135 Amps/10 Watt
Barber Colman.

Type K
Robert Shaw
M-553-81

JOB FT CARSON EEAP UPDATE

SHEET NO. 4 OF 4

CALCULATED BY AJN DATE 9/92

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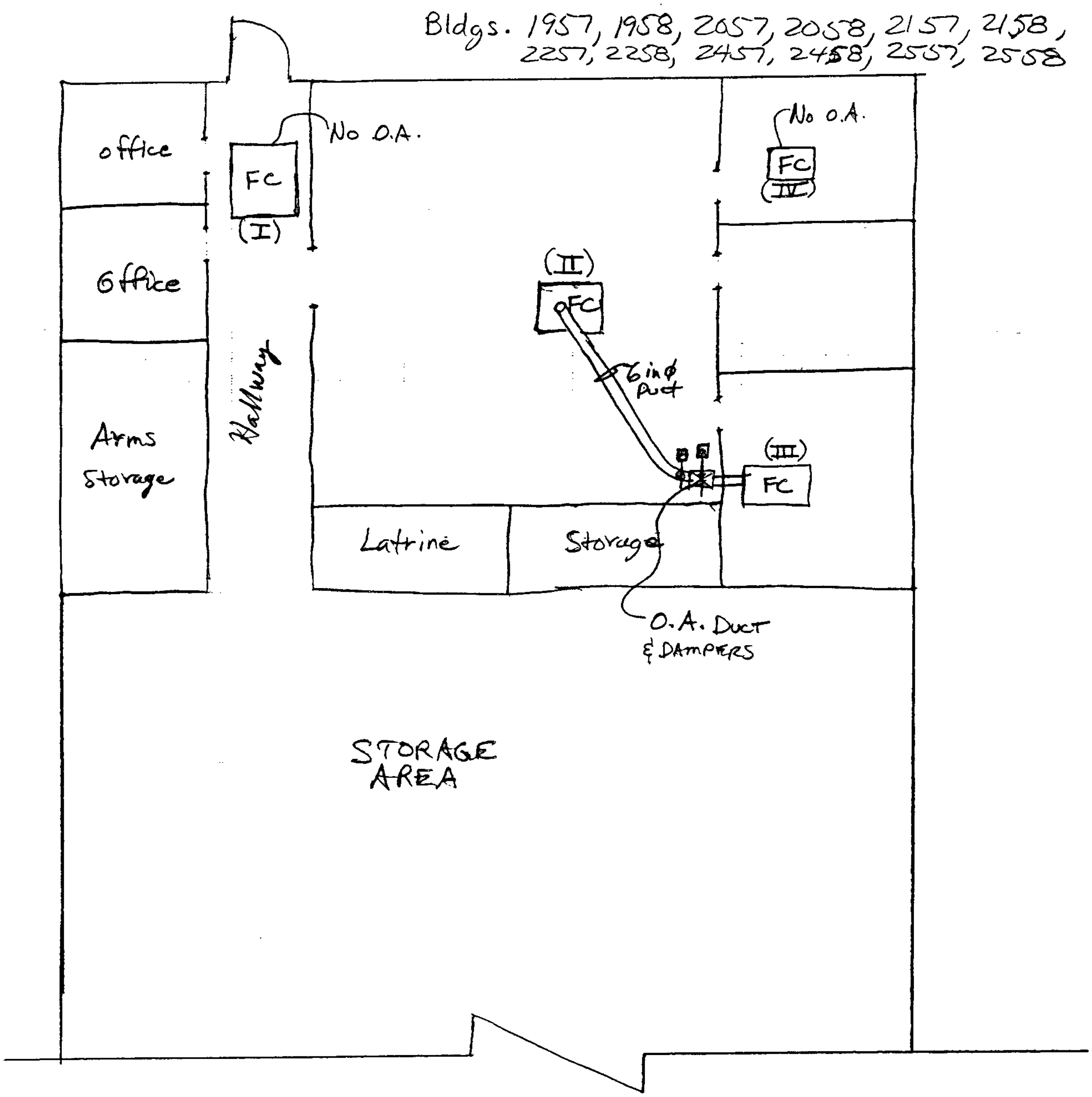
Typical Fan Coil Configuration



JOB FT CARSON EEAP UPDATE

SHEET NO. 1 OF 3

CALCULATED BY A.J.N. DATE Sept. 8 - 11, 1992

CHECKED BY DATE

SCALE

E M C ENGINEERS, INC.

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FAN COIL UNIT SURVEY

		P-1957		P-1958		P-2057		P-2058	
BLDG. AREA.	F.C. No.	C.V. STATUS	T-STAT STATUS	C.V. STATUS	T-STAT STATUS	C.V. STATUS	T-STAT STATUS	C.V. STATUS	T-STAT STATUS
S2	I					D	OP		
	II					D	OP		
	III					D	OP		
	IV					D	OP		
S1	I	D	OP	D	OP			D	OP
	II	D	OP	D	INOP			D	OP
	III	P	OP	D	OP			P	OP
	IV	D	OP	P	OP			D	OP
C	I	D	OP						
	II	D	OP						
	III	D	OP						
	IV	D	OP						
N1	I	P(leaky)	OP					D	OP
	II	D	OP					D	OP
	III	P	OP					D	INOP
	IV	P	OP					D	OP
N2	I			D	OP	D	OP		
	II			D	OP	D	OP		
	III			D	OP	D	OP		
	IV			D	OP	NONE	INOP		

← N

N2	N1	C	S1	S2

BLDG. AREA PLAN

D = disconnected
P = present & in place
OP = operable
INOP = inoperable

SUMMARY:

~ 90% of 240 Control Valves are disconnected; ~ 10% of 240 T-STATS are broken.

JOB FT CARSON EEAP UPDATE

SHEET NO. 2 OF 3

E M C ENGINEERS, INC.

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CALCULATED BY A.J.N. DATE Sept-8-11, 1992

CHECKED BY ____ DATE ____

SCALE ____

FAN COIL UNIT SURVEY

BLDG. AREA	F.C. No.	P-2157 C.V. STATUS	P-2157 T-STAT STATUS	P-2158 C.V. STATUS	P-2158 T-STAT STATUS	P-2257 C.V. STATUS	P-2257 T-STAT STATUS	P-2258 C.V. STATUS	P-2258 T-STAT STATUS
S2	I		OP				OP		
	II		OP				OP		
	III		INOP				OP		
	IV		OP				OP		
S1	I				OP				
	II				OP				
	III				OP				
	IV				OP				
C	I						OP		OP
	II						OP		OP
	III						OP		OP
	IV						INOP		OP
N1	I				OP				
	II				OP				
	III				INOP				
	IV				OP				
N2	I		OP						OP
	II		OP						OP
	III		OP						OP
	IV		OP						INOP

JOB FT CARSON EEAP UPDATE

SHEET NO. 3 OF 3

CALCULATED BY A.J.N. DATE Sept. 8-11, 1992

CHECKED BY DATE

SCALE

E M C ENGINEERS, INC.

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FAN COIL UNIT SURVEY

BLDG. AREA	F.C. No.	P-2457 C.V. STATUS	P-2457 T-STAT STATUS	P-2458 C.V. STATUS	P-2458 T-STAT STATUS	P-2557 C.V. STATUS	P-2557 T-STAT STATUS	P-2558 C.V. STATUS	P-2558 T-STAT STATUS
S2	I				OP	NONE	OP	D	OP
	II				OP	D	OP	D	OP
	III				OP	D	OP	D	INOP
	IV				OP	D	OP	D	OP
S1	I		OP						
	II		OP						
	III		OP						
	IV		INOP						
C	I					D	OP	D	OP
	II					D	OP	NONE	OP
	III					D	OP	D	OP
	IV					D	OP	D	OP
N1	I		OP						
	II		OP						
	III		OP						
	IV		OP						
N2	I				OP	D	OP	D	OP
	II				OP	D	OP	D	OP
	III				OP	D	OP	P	OP
	IV				INOP	D	OP	D	INOP

__EMEA_SURVEY_OBSERVATIONS__

3-25-93
GM

GENERAL_BUILDING_DATA

BLDG #: 1957 (B) BLDG NAME: C^O ADMIN & STORAGE______ JOB #: 124
SURVEYED BY: ~~DKD~~ DATE: ~~10-22-84~~ BLDG CONTACT: ~~SGT WYATT~~ Kolson
CONTACT TELEPHONE NUMBER: 579-5645/49 BLDG USAGE: OFFICE/STORAGE
TOT BLDG AREA: 23,140____SF # OF FLOORS: 1 # OF PEOPLE: 60

✓BUILDING OCCUPANCY:

MON - FRI:	0500	TO 1830		FIRST SHIFT:	_____
SATURDAY:	____	TO ____		SECND SHIFT:	_____
SUNDAY:	____	TO ____		THIRD SHIFT:	_____
HOLIDAYS:	____	TO ____		HOLIDAYS:	_____

✓ENVIRONMENTAL CONDITIONS:

	HEATING SETPOINTS				COOLING SETPOINTS			
	WEEKDAYS		WEEKENDS		WEEKDAYS		WEEKENDS	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
✓PRESENT T'STAT:	74*	55**						
REQUIRED T'STAT:								

THERMOSTAT LOCATION(S): OFFICE WALLS / WAREHOUSE PENDANT
HUMIDIFICATION REQUIREMENTS (RH): ____ H'STAT LOCATION(S): ________

LIGHTING: (See page 4)

	AREA(SF)	LAMP TYPE	#LMPS	W/SF	SCHEDULE ON	OFF
1)	ZONE1	FL/INC	56	0.35	0500	1830
2)	ZONE2	FL	84	0.26	0500	1830
3)						
4)						

DATA SOURCE: ✓ OBSERVATION ___ASHRAE ___OTHER
SEE ATTACHED SCHEDULE? ✓ Y ___N

✓ELECTRIC EQUIPMENT:

	AREA(SF)	TYPE	(KW)	W/SF	SCHEDULE ON	OFF
1)	ZONE1	OFFICE EQUIP		0.88	0500	1830
2)						
3)						
4)						

DATA SOURCE: ___OBSERVATION ✓ ASHRAE ___OTHER
SEE ATTACHED SCHEDULE? ___Y ✓ N

✓INTERNAL MASS: MATERIAL: PARTITIONS, EQPT ESTIMATED MASS: M (L, M, H)

✓INFILTRATION: LOCATION(S): REAR DBL DOORS - 3/4" TO 1" AT BOTTOM, 3/8" TO 1/2" AT MATE (ZONE 2)

✓ESTIMATED RATE: H (L, M, H) or
_____AIR CHANGES or
_____CFM/LIN FT CRACK

*ZONE 1 - OFFICE SPACE

**ZONE 2 - STORAGE / REPAIR SPACE

__FMEA_SURVEY_OBSERVATIONS__

GENERAL_BUILDING_DATA

✓CONSTRUCTION:

WALLS:

	CONSTRUCTION COMPONENT	WIDTH	HEIGHT	Net AREA(SF)	U-VALUE
N:	EXTWALL 100*	35'-8"	11'-0	392.33	0.0622
S:	EXTWALL 100*	35'-8"	11'-0	392.33	0.0622
E:	ZONE 2	—	—	—	—
W:	EXTWALL 99 *	241'-8"	11'-0	2094.33	0.0645

ROOFS:

CONSTRUCTION COMPONENT	WIDTH	HEIGHT	AREA(SF)	U-VALUE
ROOF 40	35'-8"	241'-8"	6986.11**	0.0414

WINDOWS:

	AREA(SF)	TYPE	SP	DP	DRAPES
N:					
S:					
E:					
W:	564	FIXED	✓		

FLOOR TYPE: ✓ SLAB ___ CRAWL SPACE ___ BASEMENT ___ OTHER*

AREA: 6986 SF

PERIMETER: 313 LF INSULATION? ✓ Y ___ N ___ IN 2" RIGID

SPECIAL AREAS: ______

ADDITIONAL NOTES: * WALL/ROOF SYSTEMS DESCRIBED IN "BLAST SIMULATION LIBRARY NON-STANDARD DEFINITIONS", ATTACHED—

** EXCLUDES ARMS VAULT (SEE DWGS)

FILM #: ________ FRAME #: ________

SKETCHES:

* Specify in "Additional Notes"

Bldg No.: 1957: ZONE 1

__FMEA_SURVEY_OBSERVATIONS__

GENERAL_BUILDING_DATA

✓ CONSTRUCTION:

WALLS:	CONSTRUCTION COMPONENT	WIDTH	HEIGHT	AREA(SF)	U-VALUE
N:	EXTWALL 100*	59'-10"	11'-0"	658.17	0.0622
S:	EXTWALL 100*	59'-10"	11'-0"	658.17	0.0622
E:	EXTWALL 100*	241'-8"	11'-0"	2658.33	0.0622
W:	ZONE 1				

ROOFS:	CONSTRUCTION COMPONENT	WIDTH	HEIGHT	AREA(SF)	U-VALUE
	ROOF 4L*	59'-10"	241'-8	16098**	0.0468

WINDOWS:	AREA(SF)	TYPE	SP	DP	DRAPES
N:	—				
S:	—				
E:	—				
W:	—				

FLOOR TYPE: ✓ SLAB ___ CRAWL SPACE ___ BASEMENT ___ OTHER*
AREA: 16098 SF

PERIMETER: 361.33 LF INSULATION? ✓ Y ___ N ___ IN 2" RIGID

SPECIAL AREAS: ______

ADDITIONAL NOTES: * SEE NOTES, ZONE 1
** AREA INCLUDES ARMS VAULT (SEE DWGS)

FILM #: ________ FRAME #: ________

SKETCHES:

* Specify in "Additional Notes"

Bldg No.: 1957: ZONE 2

*** FMEA SURVEY OBSERVATIONS ***

GENERAL BUILDING DATA

LIGHTING SCHEDULE

AREA: ZONE 1 (A) MAIN 6986.11 SF ZONE 2 (B) MEZZ 16,098 SF
(A) ________ X ________ (B) ________ X ________

DATA SOURCE: ___ DRAWINGS ✓ SURVEY TOUR

Mark	#lamps	W/Fix	#Fix	Flr #	Comments
F	2	86	26	A	
✓I	1	40	4	A	
F	2	86	~~42~~ 48	B	
F	2	86	140	A	
I	1	60	20	A	
F	2	86	200	B	

(A) TOTAL: 2396 Watts/ 6986.11 SF= 0.35 W/SF

(B) TOTAL: 4128 Watts/ 16,098 SF= 0.26 W/SF

ADDITIONAL NOTES:

(A) TOTAL: 13,240 watts/ 6986.11 SF = 1.9 W/SF
(B) TOTAL: 17,200 watts/ 16,098 SF = 1.07 W/SF

} Typical of Co. Admin/Storage Buildings.
These numbers do not reflect bulbs that are burned out.

Bldg No.: 1957

BLAST SIMULATION LIBRARY NON-STANDARD DEFINITIONS

WALL SYSTEMS:

DESIGNATION	LIB No.	DESCRIPTION	R Value	U Value
EXTWALL 97	XW97		2.4508	0.4080
	A7	4" Face Brick	0.4325	2.3121
	B1	Airspace Resistance	0.9100	1.0989
	C19	6" HW Concrete Block	0.9345	1.0700
	A6	Finish	0.1737	5.7571
EXTWALL 98	XW98		8.7998	0.1136
	A7	4" Face Brick	0.4325	0.4060
	B2	2" Insulation	6.6800	0.1497
	C2	4" LW Concrete Block	1.5136	0.6607
	A6	Finish	0.1737	5.7571
EXTWALL 99	XW99		15.5150	0.0645
	C2	LW Concrete Block	1.5136	0.6607
	AF4	Airspace, Vertical	0.9700	1.0309
	BB9	1/2" Gyp Bd, Exterior	1.3030	0.7675
	IN2	3" Min. Fiber, Fibrous	11.0000	0.0909
	BB40	5/8" Gyp Bd, Interior	0.5550	1.8018
	A6	Finish	0.1737	5.7571
EXTWALL 100	XW100		16.0700	0.0622
	IDENTICAL TO XW99 w/2 LAYERS BB40			

1

BLAST SIMULATION LIBRARY NON-STANDARD DEFINITIONS

ROOF SYSTEMS

DESIGNATION	LIB No.	DESCRIPTION	R Value	U Value
ROOF 37	RF37		7.5930	0.1316
	E2	1/2" Slag or Stone	0.0502	19.9040
	E3	3/8" Felt or Membrane	0.2845	3.5144
	B6	2" Dense Insulation	6.6800	0.1497
	C17	7" HW Concrete	0.5833	1.7144
ROOF 38	RF38		7.3897	0.1353
	E2	1/2" Slag or Stone	0.0502	19.9040
	E3	3/8" Felt or Membrane	0.2845	3.5144
	B12	1-1/2" Dense Insulation	5.0000	0.2000
	C18	4-1/2" HW Concrete	0.3750	2.6667
ROOF 39	RF39		8.5154	0.1174
	E2	1/2" Slag or Stone	0.0502	19.9040
	E3	3/8" Felt or Membrane	0.2845	3.5144
	B6	2" Dense Insulation	6.6800	0.1497
	C12	2" HW Concrete	0.1670	5.9880
	E4	Ceiling Airspace	1.0000	1.0000
	BB3	3/8" Gyp Bd, Interior	0.3337	2.9967
ROOF 40	RF40		25.1576	0.0414
	E2	1/2" Slag or Stone	0.0502	19.9040
	E3	3/8" Felt or Membrane	0.2845	3.5144
	B4	3" Insulation	10.0000	0.1000
	A3	Steel Pan	0.0019	520.0000
	IN2	3" Min. Fiber, Fibrous	11.0000	0.0955
	E4	Ceiling Airspace	1.0000	1.0000
	E5	Acoustic Tile	1.7857	0.5600
ROOF 41	RF41		21.3722	0.0468
	E2	1/2" Slag or Stone	0.0502	19.9040
	E3	3/8" Felt or Membrane	0.2845	3.5144
	B4	3" Insulation	10.0000	0.1000
	A3	Steel Pan	0.0019	520.0000
	IN2	3" Min. Fiber, Fibrous	11.0000	0.0909

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BLAST SIMULATION LIBRARY NON-STANDARD DEFINITIONS

MATERIALS

DESIGNATION	LIB No.	DESCRIPTION	R Value	U Value
INSULATION	B12	1-1/2" Dense Insulation	5.0000	0.20000
		Very Rough; TABS= 0.9000; ABS= 0.5000; L= 0.1250 K= .0250; D= 5.7000; CP= 0.2000		
BUILDING BOARD	BB3	3/8" Gyp Bd, Interior	0.3337	2.9967
		MED SMOOTH; TABS= 0.9000; ABS= 0.7500; L= 0.0313 K= 0.0938; D= 50.0000; CP= 0.2000		
	BB40	5/8" Gyp Bd, Interior	0.5550	1.8018
		MED SMOOTH; TABS= 0.9000; ABS= 0.7500; L= 0.0521 K= 0.0938; D= 50.0000; CP= 0.2000		
CONCRETE	C17	7" HW Concrete	0.5833	1.7144
		MED ROUGH; TABS= 0.9000; ABS= 0.6500; L= 0.5833 K= 1.0000; D= 140.0000; CP= 0.2000		
	C18	4-1/2" HW Concrete	0.3750	2.6667
		MED ROUGH; TABS= 0.9000; ABS= 0.6500; L= 0.3750 K= 1.0000; D= 140.0000; CP= 0.2000		
	C19	6" LW Concrete Block	1.0700	0.9346
		MED ROUGH; TABS= 0.9000; ABS= 0.6500; L= 0.5000 K= 0.2750; D= 38.0000; CP= 0.2000		

3

5 of 12

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

HEATING PLANT

PLANT DESCRIPTION:
NUMBER OF UNITS:
MAKE & MODEL: 1) CENTRAL HEAT
2) ____
3) ____

EQUIPMENT: ___ BOILER ___ DIRECT FIRED ___ STEAM CONV
TYPE: ___STEAM HI HW ___CAST IRON ___WATER TUBE, FIRE TUBE
FUEL: NAT GAS _____ ELECTRIC _____ OIL _____ OTHER ____

N/A MULTIPLE UNIT OPERATION SEQUENCE:
SERIES ____ PARALLEL ____

BURNER STAGES: ____

FIRING RATE/FUEL: #1: ____ #2: ____

BURNER TYPE: ___POWER: MFR ____ MOD No. ____
BLOWER ____/__/___-____A _____HP @_______CFM
CONTRL ____/__/___-____A
___ATMOS: MFR ____ MOD No. ____

HI HOT WATER: SUPPLY SIZE 3" TEMPERATURE 200°F PRESSURE ____PSI
RETURN SIZE 3" TEMPERATURE 180°F PRESSURE ____PSI
— STEAM: HEADER SIZE — TEMPERATURE — PRESSURE — PSI

* RATED CAPACITY: MAX BTUH IN 375,975
MAX BTUH OUT 358,281

CONTROLS: TYPE BARBER-COLEMAN ELECTRIC
CONDITION FAIR

PLANT AUXILIARIES:
208-230/460 V
9.4-9.2/4.6 A
PACO Pump
CAT. No. 03-15955-730001

PUMPS: CW/HW 1) 208/3/60-____A ~~.5~~ 3 HP **
~~2) 208/3/60-____A~~ ~~1~~ ~~HP~~ ***
COND 1) ____/__/____-____A ________HP
2) ____/__/____-____A ________HP

FANS: 1) ____/__/____-____A ________HP @________CFM
2) ____/__/____-____A ________HP @________CFM
3) ____/__/____-____A ________HP @________CFM

OTHER 1) ____/__/____-____A ________HP
2) ____/__/____-____A ________HP

AUX OPERATING SCHEDULES:
PUMPS: HW 1) ON CONT OFF YR/RND 2) ON HTG SEASON ONLY
COND 1) ON_____OFF_____ 2) ON_____OFF_____
FANS: 1) ON_____OFF_____ 2) ON_____OFF_____ 3) ON_____OFF_____
OTHER: 1) ON_____OFF_____ 2) ON_____OFF_____

AUXILIARY FUEL USED: #2 OIL ______ NAT GAS _____ OTHER ______

Bldg No.: 1957: ZONES 1 & 2

__FMEA SURVEY OBSERVATIONS__

MECHANICAL EQUIPMENT DATA

OPERATING SCHEDULE: DATE STARTED ________________
DATE STOPPED ________________

	MON - FRI	SAT	SUN
* PRESENT OPERATION:	_____ TO _____	_____ TO _____	_____ TO _____
* REQUIRED OPERATION:	_____ TO _____	_____ TO _____	_____ TO _____

OTHER PLANT COMMENTS: *"RATED CAPACITY" WAS CALCULATED FROM SPECIFICATIONS CONTAINED IN "HOT WATER CONVERTER SCHEDULE", SHT M-6, USING THE FORMULA: $Q = M \cdot C_p \Delta T$

** HW PUMP №1 SUPPLIES FAN-COILS/HEATING-COOLING

*** HW PUMP №2 SUPPLIES H&VU's/HEATING ONLY - in Bldgs P-2258, P-2457, P-2458, P-2557, & P-2558

FILM #: ______ FRAME #: ________________

SKETCH:

* --> Disregard if the item is the same as the GENERAL BUILDING DATA.

Bldg No.: 1957: ZONES 1&2

__FMEA_SURVEY_OBSERVATIONS__

MECHANICAL_EQUIPMENT_DATA

COOLING PLANT DATA:

✓DESCRIPTION:
MANUFACTURER: CENTRAL CHILLER___ MODEL: ______________________
NUMBER: ________ TYPE: ___ CENTRIFUGAL ___ ABSORPTION ___ RECIP
ENERGY SOURCE: ___ELEC ___STM ___HW ___OTHER(specify) ____________
COMPRESSOR KW ____________
CAPACITY: TONS _____________ AGE ________

N/A

CONDENSER: ___ AIR COOLED ___ WATER COOLED
UNIT OPERATION: ___ PARALLEL ___ SERIES
SYSTEM SERVES AHU No(s): ____

COOLING TOWER DATA:
MANUFACTURER: ______________________ MODEL: ______________________
TYPE: ______________________________ No. of CELLS: _____
BLOWERS: 1) _____/__/_____-____A @_____CFM
2) _____/__/_____-____A @_____CFM
3) _____/__/_____-____A @_____CFM
DISTANCE TO COOLING TOWER FROM CHILLER __________________________

CONTROLS & OPSEQ: ____
____

CAN A STRAINER CYCLE OR FLAT PLATE HEAT EXCHANGER BE INSTALLED IN THIS CASE? ____

CW TEMPERATURE: SUPPLY ___°F, RETURN ___°F, PIPE SIZE __________IN
CNW TEMPERATURE: SUPPLY ___°F, RETURN ___°F, PIPE SIZE __________IN

✓PLANT AUXILIARIES:

PUMPS: ✱ CHW	1)	208/3/60 Hz	___A	5 HP	@ 63 GPM	ON CONT	OFF_____
	2)	______/__/___Hz	___A	___HP	@____GPM	ON_____	OFF_____
CNW	1)	______/__/___Hz	___A	___HP	@____GPM	ON_____	OFF_____
	2)	______/__/___Hz	___A	___HP	@____GPM	ON_____	OFF_____
FANS:							
COOLING TOWER	1)	______/__/___Hz	___A	___HP	@____GPM	ON_____	OFF_____
	2)	______/__/___Hz	___A	___HP	@____GPM	ON_____	OFF_____
CONDENSER	1)	______/__/___Hz	___A	___HP	@____GPM	ON_____	OFF_____
	2)	______/__/___Hz	___A	___HP	@____GPM	ON_____	OFF_____
OTHER	1)	______/__/___Hz	___A	___HP	@____GPM	ON_____	OFF_____
	2)	______/__/___Hz	___A	___HP	@____GPM	ON_____	OFF_____

✓OPERATING SCHEDULE: DATE STARTED MAY 30______
DATE STOPPED OCT 15______

	MON - FRI			SAT			SUN	
* PRESENT OPERATION:	_____	TO	_____	_____ TO _____			_____ TO _____	
* REQUIRED OPERATION:	_____	TO	_____	_____ TO _____			_____ TO _____	

✱-SEE HTG PLANT NOTES "✱✱"

* --> Disregard if the item is the same as the GENERAL BUILDING DATA.

Bldg No.: 1957:ZONE 1

MECHANICAL EQUIPMENT DATA

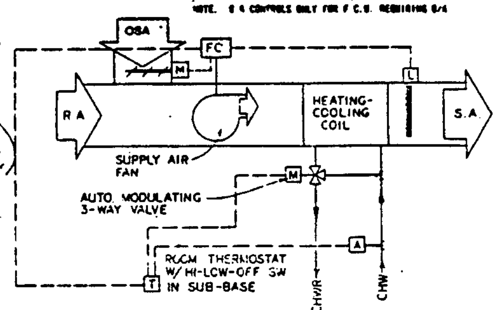
UNITARY HEATING EQUIPMENT:

UNIT NO.	TYPE	OUTPUT CAPACITY	HEATING SOURCE	CFM	HP	STARTER & CONTROL	SETPOINT
101	FCU	3260	CENTRAL HT	600/475	1/6	IND/24V	68°
102	"	13,840	"	800/570	"	"	"
103	"	10,170	"	1200/1020	"	"	"
104	"	10,165	"	1000/940	"	"	"

CFM RATINGS LISTED ARE MAX/MIN. ZONE 1 CONTAINS 5 EA. OF #'s 101, 102, 103 & 104 FOR A TOTAL HEATING CAPACITY OF 212,175 BTU/HR. ALL FCU'S ALSO PROVIDE COOLING, AS LISTED IN "UNITARY COOLING EQUIPMENT", ZONE 1.

(4 T-STATS per office area, one per FCU, X five areas)

NOTE: O A CONTROLS ONLY FOR F C.U. REQUIRING O/A



FAN COIL UNIT CONTROL DIAGRAM
NOT TO SCALE

FAN-COIL UNITS CONTROL SEQUENCE: A HEATING-COOLING ROOM TYPE THERMOSTAT SHALL MODULATE A THREE-WAY MIXING VALVE ON THE CHILLED-HOT WATER COIL TO MAINTAIN ROOM TEMPERATURE SET POINT. A STRAP-ON AQUASTAT SENSING THE SUPPLY LINE TEMPERATURE SHALL SWITCH THE ACTION OF THE ROOM THERMOSTAT TO HEATING WHEN HOT WATER IS SUPPLIED AND TO COOLING WHEN CHILLED WATER IS SUPPLIED. A HIGH-LOW-OFF SWITCH IN THERMOSTAT SUB-BASE SHALL CONTROL THE FAN.

FAN COIL UNIT WITH MINIMUM OUTSIDE AIR: CONTROL SEQUENCE AS UNIT ABOVE EXCEPT A MOTORIZED DAMPER IN THE OUTSIDE AIR OPENS WHENEVER FAN IS RUNNING. WHEN FREEZESTAT SENSES COIL DISCHARGE TEMPERATURE BELOW 38°F O A DAMPER CLOSES AND R A DAMPER TO FULLY OPEN POSITION

FILM #: _______ FRAME #: ____________________

NOTES: TYPE --> unit heater, unit ventilator, wall furnace, etc.
HEATING SOURCE --> electric, gas firec hot water, etc.
STARTER & CONTROL --> momentary, maint 24 v stat, self

Bldg No.: 1957: ZONE 1

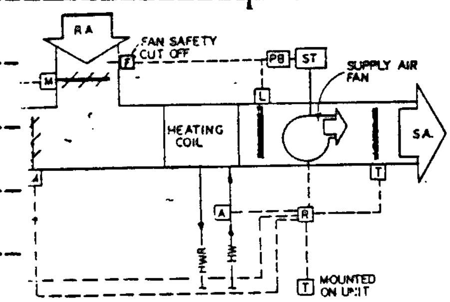
*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

UNITARY HEATING EQUIPMENT:

UNIT NO.	TYPE	OUTPUT CAPACITY	HEATING SOURCE	CFM	HP	STARTER & CONTROL	SETPOINT
HV101	H&VU	27,490	CENTRAL HT	2400/1380	3/4	CAP/LVT	55°
HV102	H&VU	19,740	"	2400/1000	3/4	"	"

HEAT & VENT UNITS ARE 2 SPEED - HI/SUMMER; LO WINTER. NO COOLING IS IS SUPPLIED BY THESE UNITS. ZONE 2 CONTAINS 2 EA. #101; 3 EA. #102 FOR A TOTAL HEATING CAPACITY OF 114,200 BTU/HR. SEE DWG # 30-14-02 SHTS M-5 & 6 FOR CONTROLS & ADD'L INFO.



G - VENTILATING UNIT CONTROL

SCALE

HEATING-VENTILATING UNIT SEQUENCE OF CONTROL: WHEN AQUASTAT SENSES PRESENCE OF HEATING WATER IN SUPPLY LINE, ROOM T-STAT SHALL START SUPPLY AIR FAN & MODULATE RETURN AIR & OUTSIDE AIR DAMPERS IN SEQUENCE TO MAINTAIN SPACE TEMP. UNLESS FREEZESTAT SENSES COIL DISCHARGE TEMP BELOW [illegible]°F. OUTSIDE AIR DAMPER CLOSES WHEN FAN IS DE-ENERGIZED.
LOW LIMIT T-STAT IN DISCH. OVERRIDES RM. T-STAT TO CLOSE OUTSIDE AIR DAMPER IF DISCHARGE AIR FALLS BELOW 55°F.
WHEN HEATING WATER IS NOT PRESENT IN SYSTEM, AND OUTSIDE AIR IS ABOVE 65°F, OUTSIDE AIR DAMPER SHALL GO TO 100% OPEN POSITION AND CLOSE R.A. FOR VENTILATION CYCLE. SUPPLY FAN SHALL BE STARTED MANUALLY AND RUN CONTINUOUSLY.

HEATING-VENTILATING UNIT WITH TWO-SPEED FAN: CONTROL SEQUENCE

SAME AS ABOVE EXCEPT UNIT FAN RUNS ON LOW SPEED IN HEATING CYCLE AND ON HIGH SPEED IN VENTILATION CYCLE.

FILM #: _______ FRAME #:

NOTES: TYPE --> unit heat : furnace, wall furr

HEATING SOURCE --: , steam,

STARTER & CONTROL], line v stat, ained, etc.

Bldg No.: 1957: ZONE 2

MECHANICAL EQUIPMENT DATA

UNITARY COOLING EQUIPMENT:

UNIT NO.	TYPE	CAPACITY	COOLING SOURCE	CFM	HP	STARTER & CONTROL	SETPOINT
101	FCU	7,110	CENTRAL CHW	600/415	1/6	IND/24V	78°
102	"	12,540	"	800/570	"	"	"
103	"	15,200	"	1200/1020	"	"	"
104	"	14,850	"	1000/940	"	"	"

CFM RATINGS LISTED ARE MAX/MIN. ZONE 1 CONTAINS 5 EA. OF UNIT #'s 101, 102, 103 & 104; FOR A TOTAL COOLING CAPACITY OF 248,500 BTU/HR. ALL FCU'S ALSO PROVIDE HEATING, AS LISTED IN "UNITARY HEATING EQUIPMENT", ZONE 1.

FILM #: FRAME #:

NOTES: TYPE --> window unit, split-dx, fan-coil, etc.
COOLING SOURCE --> electric, gas fired, chilled water, etc.
STARTER & CONTROL --> momentary, maintained, line v stat, 24 v stat, self contained, etc.

Bldg. No.: 1957: ZONE 1

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

EXHAUST FANS:

UNIT NO.	TYPE	SPACE	SP	CFM	HP	STARTER & CONTROL	SETPOINT
EE101	ROOF	TOILET(5)	.20	200	FRAC	IND/PNL SW	—
EF102	ROOF	M.E.R.	.15	265	FRAC	IND/T-STAT	85°

EF101 SERVES 5 TOILETS IN ZONE 1. EE102 IS NOT CONTAINED IN ANY ZONE.

FILM #: ________ FRAME #: ________

NOTES: TYPE --> propeller, centrifugal, etc.
STARTER & CONTROL --> momentary, maintained, line v stat, 24 v stat, self contained, etc.

**** FMEA SIMILAR BUILDINGS SURVEY FORM ****

9/92 AJN

GE[illegible] L BUILDING DATA

CSM Villines 60

BL[illegible] #: 1958(P) BLDG NAME: C° Admin & Sup 5 DATE: ~~2-13-85~~ JOB #: 124
SURVEYED BY: ~~PK/RT~~ BLDG CONTACT: ~~1SG Reynolds~~ TELEPHONE EXT: ~~5277~~ 2353
BLDG USE: Offices/Sto # FLOORS: 1 # PEOPLE: 22 BLDG AREA: 23,500 SF

BLDG OCCUPANCY: S M T W Th F S 0500 TO 1830
S M T W Th F S ______ TO ______

T'STAT SETTING: HTG: 70 / — AUTO SETBACK: N / Y: __ / __
CLG: 75 / —
Temperature,Future,inside,Occupied: 65/78 Temp Present: 72°
Temperature,Future,inside,Unoccupied: 55/— AirChange/hR: 1.5

ARCHITECTURAL

	AREA	U-value	UA
WALL	6853.67	.0622	426.30
GLASS	564.00	1.176	663.26
ROOF	23,500.00	.0452	1,042.61
FLOOR	674.30	.860	579.90
SUM			2,712.07

Avg. Floor-Ceiling Height: 9.6' Floor type: Slab Insulated: Y/N
Window frame type: Alum Wood Operable sections: Y / N
Wi[illegible] size: ____ x ____ SP DP CURT Infiltration L M H
[illegible]y doors: 15 # OH Doors: Ø % of Area Conditioned: 100

LIGHTING: Type: Fluorescent Watts/SF: .29 1.04 Util Frac: ____

ELECTRICAL EQUIP: KW/Unit: ____ #Units: ____ Util Frac: ____

DHW: TYPE: ~~NG/ELEC/CONV~~ Supply Temp: ____ GAL/Person-Day: ____
AFUE: ____ %

MECHANICAL

	HEATING	COOLING
Primary System:	HTHW → HW Conv.	CHW
Fuel:	NAG (CP)	NAG (CP)
Capacity:	359,290 BTUH	
est.Peak Del.Effic:	63.1%	52.12%
Months ON:	8	4
Hours ON:	5808	2952
AHUs Hp:	8.75	STOT ~~5.0~~
cfm:	20,785	18,000
Min OA:	10%	10%
Economizer:	→	Dumb

MISC:

HW/CW Pump - 3.0 HP 208-220/440V; 8.8/4.4A

PAGE 1 of 1

**** FMEA SIMILAR BUILDINGS SURVEY FORM ****

GENE BUILDING DATA

9/92 AJN

BLDG #: 2057(P) BLDG NAME: Cº Admin & Sup/4 DATE: ~~7-13-85~~ JOB #: 124
SURVEYED BY: ~~PE/RT~~ BLDG CONTACT: Cpl. Platt TELEPHONE EXT: 4439
BLDG USE: Offices/Sto # FLOORS: 1 # PEOPLE: 60 BLDG AREA: 18800 SF

BLDG OCCUPANCY: S M T W Th F S 0500 TO 1700
S M T W Th F S ____ TO ____

T'STAT SETTING: HTG: 70° / — AUTO SETBACK: N / Y: — / —
CLG: 75° / —
Temperature,Future,inside,Occupied: 65/78 Temp Present: 72°
Temperature,Future,inside,Unoccupied: 55/— AirChange/hR: 1.5

ARCHITECTURAL

	AREA	U-value	UA
WALL	6286.0	.0622	390.99
GLASS	452.0	1.176	531.55
ROOF	18800.0	.0468	879.84
FLOOR	577.63	.860	496.76
SUM			2291.66

Avg. Floor-Ceiling Height: 9.6 Floor type: Slab Insulated: Y/N
Window frame type: Alum Wood Operable sections: Y / N
Win size: ____ x ____ SP DP CURT Infiltration L M H
E / doors: 12 # OH Doors: 0 % of Area Conditioned: 100

LIGHTING: Type: Fluorescent Watts/SF: ~~.29~~ 1.04 Util Frac: ____

ELECTRICAL EQUIP: Office KW/Unit: ____ #Units: ____ Util Frac: ____

DHW: TYPE: ~~NG/ELEC/CONV~~ Supply Temp: ____ GAL/Person-Day: ____
AFUE: ____ %

MECHANICAL

		HEATING	COOLING
	Primary System:	HTHW → HW Conv.	CHW
	Fuel:	NaG (CP)	NaG (CP)
	Capacity:	287,480 BTUH	
	est.Peak Del.Effic:	63.1%	52.12%
	Months ON:	8	4
	Hours ON:	5808	2952
AHUs	Hp:	7	STE. 4
	cfm:	16,780	14,400
	Min OA:	10%	10%
	Economizer:	→	Dumb

MISC:
o 24 hr Watch on duty in Building

HW/CW Pump - 1.5HP (230/440V, 4.8/2.4A)
3" Batt insul. on ceiling.

PAGE 1 of 1

**** FMEA SIMILAR BUILDINGS SURVEY FORM ****

9/14/92
AJN

GEN BUILDING DATA

BLDG #: 2058/B BLDG NAME: CE Admin & Sup/4 DATE: ~~7-13-85~~ JOB #: 124
SURVEYED BY: ~~PK/RT~~ BLDG CONTACT: Rit Csevcse TELEPHONE EXT: 5157
BLDG USE: Offices/Sto # FLOORS: 1 # PEOPLE: 20 BLDG AREA: 18800 SF

BLDG OCCUPANCY: S M T W Th F S 0500 TO 1700
S M T W Th F S ______ TO ______

T'STAT SETTING: HTG: 55°/ — AUTO SETBACK: N / Y: —/—
CLG: 75°/ —
Temperature,Future,inside,Occupied: 65/78 Temp Present: 84°
Temperature,Future,inside,Unoccupied: 55/— AirChange/hR: 1.5

ARCHITECTURAL

	AREA	U-value	UA
WALL	6286.0	.0622	390.99
GLASS	452.0	1.176	531.55
ROOF	18800.0	.0468	879.84
FLOOR	577.63	.860	496.76
SUM			2291.66

Avg. Floor-Ceiling Height: 9.6 Floor type: Slab Insulated: Y/N
Window frame type: Alum Wood Operable sections: Y / N
Win size: ____ x ____ SP DP CURT Infiltration L M H
Entry doors: 12 # OH Doors: 0 % of Area Conditioned: 100

LIGHTING: Type: Fluorescent Watts/SF: ~~.29~~ 1.04 Util Frac: ____

ELECTRICAL EQUIP: Office KW/Unit: ____ #Units: ____ Util Frac: ____

DHW: TYPE: ~~NG/ELEC/CONV~~ Supply Temp: ______ GAL/Person-Day: ____
AFUE: ______%

MECHANICAL

		HEATING	COOLING
	Primary System:	HTHW → HW Conv.	CHW
	Fuel:	NaG (CP)	NaG (CP)
	Capacity:	287,480 BTUH	
	est.Peak Del.Effic:	63.1%	52.12%
	Months ON:	8	4
	Hours ON:	5808	2952
AHUs	Hp:	7	4
	cfm:	16,780	14,400
	Min OA:	10%	10%
	Economizer:	→	Dumb

MISC:

- 24 hr Watch on duty in Building
  HW/CW Pump - 1.5 HP (208-220/ 440V; 4.6-4.2/2.1A
  3in Batt insul. on ceiling.

PAGE 1 of 1

**** FMEA SIMILAR BUILDINGS SURVEY FORM ****

GEN ' BUILDING DATA

9/92 AJN/JOE

BLDG #: 2157(P) BLDG NAME: C° Admin & Sup/4 DATE: ~~2-13-85~~ JOB #: 124
SURVEYED BY: ~~PK/RF~~ BLDG CONTACT: Sgt Hoffman TELEPHONE EXT: 2139
BLDG USE: Offices/Sto # FLOORS: 1 #OPEOPLE: ___ BLDG AREA: 18800 SF

BLDG OCCUPANCY: S M T W Th F S 0500 TO 1630
S M T W Th F S ___ TO ___

T'STAT SETTING: HTG: 70 / — AUTO SETBACK: N / Y: — / —
CLG: 72° / —
Temperature,Future,inside,Occupied: 65/78 Temp Present: 70
Temperature,Future,inside,Unoccupied: 55/— AirChange/hR: 1.5

ARCHITECTURAL

	AREA	U-value	UA
WALL	6286.0	.0622	390.99
GLASS	452.0	1.176	531.55
ROOF	18800.0	.0468	879.84
FLOOR	577.63	.860	496.76
SUM			2291.66

Avg. Floor-Ceiling Height: 9.6 Floor type: Slab Insulated: Y/N
Window frame type: Alum Wood Operable sections: Y / N
Wi ' size: ___ x ___ SP DP CURT Infiltration L M H
L y doors: 12 # OH Doors: 0 % of Area Conditioned: 100

LIGHTING: Type: Fluorescent Watts/SF: ~~.25~~ 1.40 Util Frac: ___

ELECTRICAL EQUIP: Office KW/Unit: ___ #Units: ___ Util Frac: ___

DHW: TYPE: ~~NG/ELEC/CONV~~ Supply Temp: ___ GAL/Person-Day: ___
AFUE: ___ %

MECHANICAL

		HEATING	COOLING
	Primary System:	HTHW → HW Conv.	CHW
	Fuel:	NaG (CP)	NaG (CP)
	Capacity:	287,480 BTUH	
	est.Peak Del.Effic:	63.1%	52.12%
	Months ON:	8	4
	Hours ON:	5808	2952
AHUs	Hp:	7	4
	cfm:	16,780	14,400
	Min OA:	10%	10%
	Economizer:	→	Dumb

MISC:

CW/HW Pump = 2HP at 208-220/440V; 6.4/3.2A. Gpm = 62; 50ft. Head.
Federal, Brooklyn, N.Y. 1-1/4 C-K-2-4
3in. Batt. Insul. on ceiling.

PAGE 1 of 1

B2157

4 FC units in offices up front. Originally, (T) controlled FC CV's & fan ran continuously. Now, FC CV's have been disabled and (T) turns fan on/off on demand. OA damper is supposed to open w/ fan on and close w/ fan off. OA is on only two of the FC's. We turned these two FC's off, but the OA damper did not move. Don't know if the OA damper is open or closed. 1 of the FC's does not operate when (T) calls for it. Strap on (T) accomplishes changeover of (T) action. On one FC this didn't seem to work. The strap on (T) was installed in a manner so that it doesn't contact the pipe.

Recommendation:

A. 1) Connect FC CV's to close when (T) turns fan off & vice versa. or
★ 2) Remove FC CV's altogether. Leave control as is.
B. Fix OA damper control & FC control on the unit that doesn't work.
C. Replace inoperable strap-on (T)'s.
D Install night setback (T).
E. 1) Eliminate tight fitting OA dampers because there's a lot of infiltration from other sources & because infiltration through OA damper is minimal w/ fan off. or
2) Replace OA damper when actuator is replaced. Use new OA damper w/ seals.

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JOB FT CARSON EEAP UPDATE
SHEET NO. 2 OF 2
CALCULATED BY JOE DATE 9/92
CHECKED BY ____ DATE ____
SCALE ____

B2157 (cont)

H&V Unit in back storage area. Fan is off @ time of survey.

T modulates OA/RA damper together on same actuator and also appears to modulate 3-way valve. (Valve has no position indicator, so its hard to tell).

Upon call for heat from the T, the OA damper comes open & RA is closed. Upon call for cooling, the OA damper & RA damper are modulated to a mixed air position. This appears to be wrong.

Unit has an HOA switch. The unit runs in both hand & auto positions. It's not apparent what controls the fan in the auto position.

Disch. air. T is set @ 62 F. When DAT < DA T setpoint, dampers are in mixed air position. When DAT > DA T setpoint, dampers go to almost 100% OA (not quite).

**** FMEA SIMILAR BUILDINGS SURVEY FORM ****

9/92 AJN

GENERAL BUILDING DATA

BLDG #: 2158(P) BLDG NAME: Co Admin & Sup/4 DATE: ~~7-13-85~~ JOB #: 124
SURVEYED BY: ~~PK/RF~~ BLDG CONTACT: Sgt Suarez TELEPHONE EXT: 2933
BLDG USE: Offices/Sto # FLOORS: 1 # PEOPLE: 60 BLDG AREA: 18800 SF

BLDG OCCUPANCY: S M T W Th F S 0600 TO 1730
S M T W Th F S ______ TO ______

T'STAT SETTING: HTG: 85°/ — AUTO SETBACK: N / Y: __/__
CLG: 72°/ —
Temperature,Future,inside,Occupied: 65/78 Temp Present: 72°
Temperature,Future,inside,Unoccupied: 55/— AirChange/hR: 1.5

ARCHITECTURAL

	AREA	U-value	UA
WALL	6286.0	.0622	390.99
GLASS	452.0	1.176	531.55
ROOF	18800.0	.0468	879.84
FLOOR	577.63	.860	496.76
SUM			2291.66

Avg. Floor-Ceiling Height: 9.6 Floor type: Slab Insulated: Y/N
Window frame type: Alum Wood Operable sections: Y / N
Window size: ____ x ____ SP DP CURT Infiltration L M H
Ext / doors: 12 # OH Doors: 0 % of Area Conditioned: 100

LIGHTING: Type: Fluorescent Watts/SF: ~~.25~~ 1.04 Util Frac: ____

ELECTRICAL EQUIP: Office KW/Unit: ____ #Units: ____ Util Frac: ____

DHW: TYPE: ~~NG/ELEC/CONV~~ Supply Temp: ____ GAL/Person-Day: ____
AFUE: ____%

MECHANICAL

		HEATING	COOLING
	Primary System:	HTHW → HW Conv.	CHW
	Fuel:	NaG (CP)	NaG (CP)
	Capacity:	287,480 BTUH	
	est.Peak Del.Effic:	63.1%	52.12%
	Months ON:	8	4
	Hours ON:	5808	2952
AHUs	Hp:	7	4
	cfm:	16,780	14,400
	Min OA:	10%	10%
	Economizer:	→	Dumb

MISC:

CW/HW pump = 2HP at 220/~~440~~V; 6.4/3.2A

Note in MER = Htg OFF/Clg ON at 5-6-92

PAGE 1 of 1

**** FMEA SIMILAR BUILDINGS SURVEY FORM ****

9/92 AJN

BUILDING DATA

BLDG #: 7257(P) BLDG NAME: Co Admin & Sup/4 DATE: ~~7-13-85~~ JOB #: 124
SURVEYED BY: ~~WW/AM~~ BLDG CONTACT: Cpt Higgins TELEPHONE EXT: 2435
BLDG USE: Offices/Sto # FLOORS: ___ # PEOPLE: ___ BLDG AREA: 18800 SF

BLDG OCCUPANCY: S (M T W Th F) S 0700 TO 1630
S M T W Th F S ______ TO ______

T'STAT SETTING: HTG: 85 / — AUTO SETBACK: (N) / Y: __ / __
CLG: 75 / —
Temperature,Future,inside,Occupied: 65/78 Temp Present: 76°
Temperature,Future,inside,Unoccupied: 55/— AirChange/hR: 1.5

ARCHITECTURAL

	AREA	U-value	UA
WALL	6286.0	.0622	390.99
GLASS	452.0	1.176	531.55
ROOF	18800.0	~~.0468~~ 0.076	~~879.84~~ 1,429.16
FLOOR	577.63	.860	496.76
SUM			2291.66

Avg. Floor-Ceiling Height: 9.6 Floor type: Slab Insulated: (Y)/N
Window frame type: (Alum) Wood Operable sections: Y / N
Win size: ___ x ___ (SP) DP CURT Infiltration L (M) H
E y doors: 12 # OH Doors: Ø % of Area Conditioned: 100

LIGHTING: Type: Fluorescent Watts/SF: ~~.25~~ 1.30 Util Frac: ___

ELECTRICAL EQUIP: Office KW/Unit: ___ #Units: ___ Util Frac: ___

DHW: TYPE: ~~NG/ELEC/CONV~~ Supply Temp: ___ GAL/Person-Day: ___
AFUE: ___ %

MECHANICAL

		HEATING	COOLING
	Primary System:	HTHW → HW Conv.	CHW
	Fuel:	NaG (CP)	NaG (CP)
	Capacity:	287,480 BTUH	
	est.Peak Del.Effic:	63.1%	52.12%
	Months ON:	8	4
	Hours ON:	5808	2952
AHUs	Hp:	7	4
	cfm:	16,780	14,400
	Min OA:	10%	10%
	Economizer:	→	Dumb

MISC:
- Bad HW/CHW Pump Seal, Heavy Condensate in MER
- OA T-stat = 56°
- 2 HP HW/CW pump – Fan Coil Units, 220/~~440~~V; 6.4/3.2 Amp
- Note in MER – Htg OFF / Clg on at 5-6-92

**** FMEA SIMILAR BUILDINGS SURVEY FORM ****

9/92 AJN

GEN[illegible]L BUILDING DATA

BLDG #: 2258(P) BLDG NAME: Co Admin & Sup/4 DATE: ~~2 13 85~~ JOB #: 124
SURVEYED BY: ~~WW/AM~~ BLDG CONTACT: LSG Borden TELEPHONE EXT: 4281
BLDG USE: Offices/Sto # FLOORS: 1 # PEOPLE: ___ BLDG AREA: 18800 SF

BLDG OCCUPANCY: S M T W Th F S 0630 TO 1800
S M T W Th F S ___ TO ___

T'STAT SETTING: HTG: 85 / — AUTO SETBACK: N / Y: — / —
CLG: 75 / —
Temperature,Future,inside,Occupied: 65/78 Temp Present: 74°
Temperature,Future,inside,Unoccupied: 55/— AirChange/hR: 1.5

ARCHITECTURAL

	AREA	U-value	UA
WALL	6286.0	.0622	390.99
GLASS	452.0	1.176	531.55
ROOF	18800.0	~~.0468~~ 0.076	879.84
FLOOR	577.63	.860	496.76
SUM			2291.66

Avg. Floor-Ceiling Height: 9.6 Floor type: Slab Insulated: Y/N
Window frame type: Alum Wood Operable sections: Y / N
Wi[illegible] size: ___ x ___ SP DP CURT Infiltration L M H
[illegible] y doors: 12 # OH Doors: 0 % of Area Conditioned: 100

LIGHTING: Type: Fluorescent Watts/SF: ~~.25~~ 1.04 Util Frac: ___

ELECTRICAL EQUIP: Office KW/Unit: ___ #Units: ___ Util Frac: ___

DHW: TYPE: ~~NG/ELEC/CONV~~ Supply Temp: ___ GAL/Person-Day: ___
AFUE: ___ %

MECHANICAL

	HEATING	COOLING
Primary System:	HTHW → HW Conv.	CHW
Fuel:	NaG (CP)	NaG (CP)
Capacity:	287,480 BTUH	
est.Peak Del.Effic:	63.1%	52.12%
Months ON:	8	4
Hours ON:	5808	2952
AHUs Hp:	7	4
cfm:	16,780	14,400
Min OA:	10%	10%
Economizer:	→	Dumb

MISC:

HW/CW pump - 2 HP for Fan coils
HW pump for HV units - 1 HP 208V/3.5A
No 3 in Batt insul. on ceiling

**** FMEA SIMILAR BUILDINGS SURVEY FORM ****

9/92 AJN

GEN[illegible]L BUILDING DATA

BLDG #: 7457 (P) BLDG NAME: Co Admin & Sup 5 DATE: ~~2-13-85~~ JOB #: 124
SURVEYED BY: ~~RK/RF~~ BLDG CONTACT: Pvt Nelson TELEPHONE EXT: 2843
BLDG USE: Offices/Sto # FLOORS: 1 # PEOPLE: 20 BLDG AREA: 23,500 SF

BLDG OCCUPANCY: S M T W Th F S 0600 TO 1800
S M T W Th F S ____ TO ____

T'STAT SETTING: HTG: 90° / — AUTO SETBACK: N / Y: — / —
CLG: 75° / —
Temperature,Future,inside,Occupied: 65/78 Temp Present: 72°
Temperature,Future,inside,Unoccupied: 55/— AirChange/hR: 1.5

ARCHITECTURAL

	AREA	U-value	UA
WALL	6853.67	.0622	426.30
GLASS	564.00	1.176	663.26
ROOF	23,500.00	~~.0452~~ 0.076	1,042.61
FLOOR	674.30	.860	579.90
SUM			2,712.07

Avg. Floor-Ceiling Height: 9.6' Floor type: Slab Insulated: Y/N
Window frame type: Alum Wood Operable sections: Y / N
Wi[illegible] w size: ____ x ____ SP DP CURT Infiltration L M H
[illegible]y doors: 15 # OH Doors: 0 % of Area Conditioned: 100

LIGHTING: Type: Fluorescent Watts/SF: ~~.29~~ 1.04 Util Frac: ____

ELECTRICAL EQUIP: KW/Unit: ____ #Units: ____ Util Frac: ____

DHW: TYPE: ~~NG/ELEC/CONV~~ Supply Temp: ____ GAL/Person-Day: ____
AFUE: ____ %

MECHANICAL

		HEATING	COOLING
	Primary System:	HTHW → HW Conv.	CHW
	Fuel:	NAG (CP)	NAG (CP)
	Capacity:	359,290 BTUH	
	est.Peak Del.Effic:	63.1%	52.12%
	Months ON:	8	4
	Hours ON:	5808	2952
AHUs	Hp:	8.75	5.0
	cfm:	20,785	18,000
	Min OA:	10%	10%
	Economizer:	→	Dumb

MISC:
- 24 hr Watch on duty in Building
- 3HP HW/CW pump; 1.5HP HW pump for HV unit.
- Linkage between O.A. & R.A. dampers is missing on 1 HV unit.
- No 3in Batt insul. on ceiling.

**** FMEA SIMILAR BUILDINGS SURVEY FORM ****

9/92 AJN

GENERAL BUILDING DATA

BLDG #: 2458(P) BLDG NAME: Co Admin & Sup 5 DATE: ~~2-13-85~~ JOB #: 124
SURVEYED BY: ~~PK/RT~~ BLDG CONTACT: SGT Campos TELEPHONE EXT: 3563
BLDG USE: Offices/Sto # FLOORS: 1 # PEOPLE: 20 BLDG AREA: 23,500 SF

BLDG OCCUPANCY: S M T W Th F S 0600 TO 1800
S M T W Th F S ______ TO ______

T'STAT SETTING: HTG: ____/—— AUTO SETBACK: N / Y: ——/——
CLG: ____/——
Temperature,Future,inside,Occupied: 65/78 Temp Present: ____
Temperature,Future,inside,Unoccupied: 55/— AirChange/hR: 1.5

ARCHITECTURAL

	AREA	U-value	UA
WALL	6853.67	.0622	426.30
GLASS	564.00	1.176	663.26
ROOF	23,500.00	~~.0452~~ 0.076	1,042.61
FLOOR	674.30	.860	579.90
SUM			2,712.07

Avg. Floor-Ceiling Height: 9.6' Floor type: Slab Insulated: Y/N
Window frame type: Alum Wood Operable sections: Y / N
Window size: ____ x ____ SP DP CURT Infiltration L M H
Entry doors: 15 # OH Doors: Ø % of Area Conditioned: 100

LIGHTING: Type: Fluorescent Watts/SF: ~~.29~~ 1.04 Util Frac: ____

ELECTRICAL EQUIP: KW/Unit: ____ #Units: ____ Util Frac: ____

DHW: TYPE: ~~NG/ELEC/CONV~~ Supply Temp: ____ GAL/Person-Day: ____
AFUE: ____%

MECHANICAL

		HEATING	COOLING
	Primary System:	HTHW → HW Conv.	CHW
	Fuel:	NAG (CP)	NAG (CP)
	Capacity:	359,290 BTUH	
	est.Peak Del.Effic:	63.1%	52.12%
	Months ON:	8	4
	Hours ON:	5808	2952
AHUs	Hp:	8.75	5.0
	cfm:	20,785	18,000
	Min OA:	10%	10%
	Economizer:	→	Dumb

MISC:
- 24 hr Watch on duty in building

HW/CW pump = 3 HP; HW pump = 1.5 HP for HV units.
No 3 in Batt insul. on ceiling

PAGE 1 of 1

**** FMEA SIMILAR BUILDINGS SURVEY FORM ****

9/92 AJN

GEN L BUILDING DATA

BLDG #: 2557 (P) BLDG NAME: Co Admin & Sup S DATE: ~~2-13-85~~ JOB #: 124
SURVEYED BY: ~~PK/RF~~ BLDG CONTACT: 1SGT Bastidos TELEPHONE EXT: 8055
BLDG USE: Offices/Sto # FLOORS: 1 # PEOPLE: 14 BLDG AREA: 23,500 SF

BLDG OCCUPANCY: S M T W Th F S 0630 TO 1730
S M T W Th F S ____ TO ____

T'STAT SETTING: HTG: 85/ — AUTO SETBACK: N / Y: __/__
CLG: 75/ —
Temperature,Future,inside,Occupied: 65/78 Temp Present: 62
Temperature,Future,inside,Unoccupied: 55/— AirChange/hR: 1.5

ARCHITECTURAL

	AREA	U-value	UA
WALL	6853.67	.0622	426.30
GLASS	564.00	1.176	663.26
ROOF	23,500.00	~~.0452~~ 0.076	1,042.61
FLOOR	674.30	.860	579.90
SUM			2,712.07

Avg. Floor-Ceiling Height: 9.6' Floor type: Slab Insulated: Y/N
Window frame type: Alum Wood Operable sections: Y / N
Wi[illegible] size: ____ x ____ SP DP CURT Infiltration L M H
[illegible]y doors: 15 # OH Doors: Ø % of Area Conditioned: 100

LIGHTING: Type: Fluorescent Watts/SF: ~~.29~~ 1.04 Util Frac: ____

ELECTRICAL EQUIP: KW/Unit: ____ #Units: ____ Util Frac: ____

DHW: TYPE: ~~NG/ELEC/CONV~~ Supply Temp: ____ GAL/Person-Day: ____
AFUE: ____ %

MECHANICAL

	HEATING	COOLING
Primary System:	HTHW → HW Conv.	CHW
Fuel:	NAG (CP)	NAG (CP)
Capacity:	359,290 BTUH	
est.Peak Del.Effic:	63.1%	52.12%
Months ON:	8	4
Hours ON:	5808	2952
AHUs Hp:	8.75	5.0
cfm:	20,785	18,000
Min OA:	10%	10%
Economizer:	→	Dumb

MISC:

HW/CW pump = 3 HP; HW pump = 1.5 HP for HV units.
No 3 in Batt insul. on ceiling.

**** FMEA SIMILAR BUILDINGS SURVEY FORM ****

9/92 AJN

GENERAL BUILDING DATA

BLDG #: 2558 (P) BLDG NAME: Co Admin & Sup 5 DATE: ~~2-13-85~~ JOB #: 124
SURVEYED BY: ~~PK/RF~~ BLDG CONTACT: SFC Branscom TELEPHONE EXT: 2910
BLDG USE: Offices/Sto # FLOORS: 1 # PEOPLE: 8 BLDG AREA: 23,500 SF

BLDG OCCUPANCY: S M T W Th F S 0530 TO 1745
S M T W Th F S ____ TO ____

T'STAT SETTING: HTG: 60 / — AUTO SETBACK: N / Y: — / —
CLG: 75 / —
Temperature,Future,inside,Occupied: 65/78 Temp Present: 70
Temperature,Future,inside,Unoccupied: 55/— AirChange/hR: 1.5

ARCHITECTURAL

	AREA	U-value	UA
WALL	6853.67	.0622	426.30
GLASS	564.00	1.176	663.26
ROOF	23,500.00	~~.0452~~ 0.076	1,042.61
FLOOR	674.30	.860	579.90
SUM			2,712.07

Avg. Floor-Ceiling Height: 9.6' Floor type: Slab Insulated: Y/N
Window frame type: Alum Wood Operable sections: Y / N
Window size: ____ x ____ SP DP CURT Infiltration L M H
Entry doors: 15 # OH Doors: Ø % of Area Conditioned: 100

LIGHTING: Type: Fluorescent Watts/SF: ~~.25~~ 1.04 Util Frac: ____

ELECTRICAL EQUIP: KW/Unit: ____ #Units: ____ Util Frac: ____

DHW: TYPE: ~~NG/ELEC/CONV~~ Supply Temp: ____ GAL/Person-Day: ____
AFUE: ____ %

MECHANICAL

	HEATING	COOLING
Primary System:	HTHW → HW Conv.	CHW
Fuel:	NaG (CP)	NaG (CP)
Capacity:	359,290 BTUH	
est.Peak Del.Effic:	63.1%	52.12%
Months ON:	8	4
Hours ON:	5808	2952
AHUs Hp:	8.75	5.0
cfm:	20,785	18,000
Min OA:	10%	10%
Economizer:	→	Dumb

MISC:

3HP HW/CW pump; 1.5HP HW pump on HV units.
No 3in Batt insul. on ceiling.

JOB # 2102-001 FT CARSON FEAP UPDATE

SHEET NO. 2 OF 2

E M C ENGINEERS, INC.

Denver • Atlanta • Germany

CALCULATED BY A. Niemoyer DATE 9-14-92

CHECKED BY ________ DATE ________

SCALE ________

Control Point Survey Battalion Bldgs.

BLDG. No.	MULTI ZONE ~~FAN COIL~~ UNITS: 3-WAY COIL VALVE ACT. TYPE	SIZE (IN.)	STATUS	Relief ~~O.A.~~ DAMPER ACT. TYPE	STATUS	~~BUILDING SPACE~~ MER HV UNITS: 3-WAY COIL VALVE ACT. TYPE	SIZE (IN.)	STATUS	O.A./R.A. DAMPER ACT. TYPE	STATUS	COMMENTS
P-2350				F1	DIS				F	OP	
P-1853				NONE	(No Damper)				F(O.A.) F1(R.A.)	UN UN	Set at 90°F
P-2060				"	"				F(O.A.) F1(R.A.)	UN UN	Set at 60°F
P-2160				"	"				"	"	"
P-2352				F1	UN				F	UN	

JOB #2102-001 FT CARSON EEAP UPDATE
SHEET NO. 1 OF 2
CALCULATED BY A. Niemeyer DATE 9-14-92
CHECKED BY ____ DATE ____
SCALE ____

E M C ENGINEERS, INC.
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Control Point Survey Battalion Bldgs.

BLDG. No.	MER: CW 2-WAY VALVE			HTHW 2-WAY VALVE			3-WAY COIL ~~CHANGEOVER (C.O.)~~ VALVE (HOT DECK)			O.A. TEMP. RESET ON C.O. VALVE	HW/CW Pump CONTROLS			COMMENTS
	ACT. TYPE	SIZE (IN.)	STATUS	ACT. TYPE	SIZE (IN.)	STATUS	ACT. TYPE	SIZE (IN.)	STATUS		HIGH (°F)	LOW (°F)	STATUS	
P-2350	D	1.5	OP	A	0.5	OP	B	1.5	UN					
P-1853	"	"	UN	"	1.0	UN	F2	"	UN					
P-2060	"	"	UN	"	1.0	UN	F3	"	UN					
P-2160	"	"	UN	"	1.0	UN	F3	"	UN					
P-2352	"	"	OP	"	0.5	UN	B	"	OP					
P-2700	"	"	OP	"	1.0	UN	B	1¼	UN					
							cold deck							
							B	2	DIS					

UN = unable to check because heat was not on in the building.

*** FMEA SURVEY OBSERVATIONS ***

3/25/93
TM

GENERAL BUILDING DATA

BLDG #: 2350 BLDG NAME: ZBD ADMIN & CLASSROOMS JOB #: 124
SURVEYED BY: DD/PK DATE: ~~11-20-85~~ BLDG CONTACT: SGT SILKMAN
CONTACT TELEPHONE NUMBER: X2617 BLDG USAGE: OFFICES/CLASSES
TOT BLDG AREA: 17373.6 SF # OF FLOORS: 1 # OF PEOPLE: 112
3 ZONES

BUILDING OCCUPANCY:

MON - FRI:	~~0700~~ 0600	TO ~~1500~~ 1600		FIRST SHIFT:	
SATURDAY:	—	TO —		SECND SHIFT:	
SUNDAY:	—	TO —		THIRD SHIFT:	
HOLIDAYS:	—	TO —		HOLIDAYS:	

ENVIRONMENTAL CONDITIONS:

	HEATING SETPOINTS				COOLING SETPOINTS			
	WEEKDAYS		WEEKENDS		WEEKDAYS		WEEKENDS	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
PRESENT T'STAT:	68°F	68°F	68°F	68°F	78°F	78°F	78°F	78°F
REQUIRED T'STAT:	65°F	55°F	55°F	55°F	78°F	OFF	OFF	OFF

THERMOSTAT LOCATION(S): CONF. RMS, HALLWAY, CL ROOMS, OFFICES (7)
HUMIDIFICATION REQUIREMENTS (RH): — H'STAT LOCATION(S): —

LIGHTING:

ZN	AREA(SF)	LAMP TYPE	#LMPS	W/SF	SCHEDULE ON	OFF
1)	8031.6	FL (12,838 W)	—	1.60		
2)	6524.0	FL (10,443 W)	—	1.60		
3)	2818.0	FL (4510 W)	—	1.60		
4)						

DATA SOURCE: X OBSERVATION ___ASHRAE ___OTHER
SEE ATTACHED SCHEDULE? ___Y X N

ELECTRIC EQUIPMENT:

	AREA(SF)	TYPE	(KW)	W/SF	SCHEDULE ON	OFF
1)		INSIGNIFICANT				
2)						
3)						
4)						

DATA SOURCE: X OBSERVATION ___ASHRAE ___OTHER
SEE ATTACHED SCHEDULE? ___Y X N

INTERNAL MASS: MATERIAL: — ESTIMATED MASS: (L, M, H) — L circled

INFILTRATION: LOCATION(S): DOORS, ENTRY & DOUBLE

ESTIMATED RATE: _____(L, M, H) or
_____AIR CHANGES or
_____CFM/LIN FT CRACK

ZONE 1
3470 ACFM DAY
1135 ACFM NITE

ZONE 2
2174.67 ACFM DAY
1087.34 ACFM NITE

ZONE 3
939.3 ACFM DAY
469.65 ACFM NITE

Bldg No.: P2350

__FMEA_SURVEY_OBSERVATIONS__

GENERAL BUILDING DATA

CONSTRUCTION:

WALLS: ✓

CONSTRUCTION COMPONENT		WIDTH	HEIGHT	AREA (SF)	U-VALUE
4" LW CMU/2" INS/AIRSPC/	N :	36.0	12.0	432.0	.0977
6" HW CMU	E:	223.2	12.0	2678.4	.0977
	S :	36.0	12.0	432.0	.0977
	W:				

ROOFS: ✓

CONSTRUCTION COMPONENT		WIDTH	LENGTH	AREA (SF)	U-VALUE
BUILT UP ROOF/3" INS/MTL PAN	1:	223.12	36.0	8034.12	0.0468
3" INS	2:				
	3:				
	4:				

WINDOWS:

	AREA (SF)	TYPE			
N :			__ SF	__ DF	__ DRAPES
E:			__ SF	__ DF	__ DRAPES
S :			__ SF	__ DF	__ DRAPES
W:			__ SF	__ DF	__ DRAPES

FLOOR TYPE: ✓

AREA: 8031.6 SF X SLAB __ CRAWL SPACE __ BASEMENT __ OTHER*

PERIM: 518.2 LF INSULATION: X Y __ N 2 IN TO 24"

SPECIAL AREAS:

NOTES:

FILM #: FRAME #:

SKETCHES:

Bldg No.: P2350 ZONE 1

*** FMEA SURVEY OBSERVATIONS ***

GENERAL BUILDING DATA

CONSTRUCTION:

WALLS: ✓

CONSTRUCTION COMPONENT		WIDTH	HEIGHT	AREA (SF)	U-VALUE
4" LWCMU/2" INS/AIRSPC/	N:	33.0	12.0	396.0	0.0977
6" HWCMU	E:	—	—	—	—
	S:	61.0	12.0	732.0	0.0977
	W:	231.0	12.0	2227.0	0.0977

ROOFS: ✓

CONSTRUCTION COMPONENT		WIDTH	LENGTH	AREA (SF)	U-VALUE
BUILT UP ROOF/3" INS/MTL PAN/	1:	163.1	40.0	6524.0	0.0968
3" INS	2:				
	3:				
	4:				

WINDOWS: ✓

	AREA (SF)	TYPE			
N:	—		— SF	DP	DRAPES
E:	—		— SF	DP	DRAPES
S:	—		— SF	DP	DRAPES
W:	545.0	1/4" PLATE	X SF	DP	DRAPES

FLOOR TYPE:

AREA: 6524.0 SF X SLAB __ CRAWL SPACE __ BASEMENT __ OTHER*

PERIM: 406.2 LF INSULATION: X Y __ N 2 IN TO 24"

SPECIAL AREAS:

NOTES:

FILM #: FRAME #:

SKETCHES:

*** FMEA SURVEY OBSERVATIONS ***

GENERAL BUILDING DATA

CONSTRUCTION:

WALLS:

CONSTRUCTION COMPONENT		WIDTH	HEIGHT	AREA (SF)	U-VALUE
4" LWCMU/2" INS/AIR SPC/	N:	—			
6" HWCMU	E:	—			
	S:	—			
	W:	28.0	12.0	336	0.0977

ROOFS:

CONSTRUCTION COMPONENT		WIDTH	LENGTH	AREA (SF)	U-VALUE
BUILT UP ROOF/3" INS/MTL PAN/	1:	140.9	20.0	2818.0	0.0468
3" INS	2:				
	3:				
	4:				

WINDOWS:

	AREA (SF)	TYPE	SP	DP	DRAPES
N:	—		__ SP	__ DP	__ DRAPES
E:	—		__ SP	__ DP	__ DRAPES
S:	—		__ SP	__ DP	__ DRAPES
W:	—		__ SP	__ DP	__ DRAPES

FLOOR TYPE:

AREA: 2818 SF X SLAB __ CRAWL SPACE __ BASEMENT __ OTHER*

PERIM: 321.8 LF INSULATION: X Y __ N 2 IN TO 24"

SPECIAL AREAS: ______

NOTES: ______

FILM #: ______ FRAME #: ______

SKETCHES:

***** FMEA SURVEY OBSERVATIONS *****

MECHANICAL EQUIPMENT DATA

AIR HANDLING UNITS: ✓

MANUFACTURER: TRANE TORRI-VENT MODEL No. 35
AHU NUMBER: 1 AHU TYPE: MZU BLOW THRU (7 ZONE)
LOCATION: MER SPACE SERVED: BUILDING

FAN DATA: ✓

SUPPLY FAN HP: 7.5 SUPPLY CFM: 18,210 STATIC PRESS: 1"
RETURN FAN HP: — RETURN CFM: — STATIC PRESS: —
EXHAUST FAN HP: — EXHAUST CFM: — STATIC PRESS: —
MOTOR STARTER: MNT __ MOM __. SWITCH: P.B. __ H.O.A. X DISCON __

COILS: ✓

HEATING: HW X STM __ DIRECT FIRED --> NG __ OIL __ ELC __ OTHER __
COOLING: CW X DX __. FROM CHILLER ________, FROM DX UNIT ______
REHEAT: # OF COILS ___ TYPE _____. RECOOL: # OF COILS ___ TYPE ____
HUMIDITY: STM __ SPRAY __ ELC __. HW/CW COIL VALVES: 2 WAY __, 3 WAY __

DAMPERS: ✓

O.A. DAMPER: __ (Y N), IF YES, FIXED __%, MODULATING __% TO __%
R.A. DAMPER: __ (Y N), IF YES, FIXED __%, MODULATING __% TO __%
E.A. DAMPER: __ (Y N), IF YES, FIXED __%, MODULATING __% TO __%
ECONOMIZER: __ (Y N), IF YES, OA X RA __ ENTHALPY __
OA LEAKAGE: _______% IF NO, CAN ECONOMIZER BE ADDED ________

FILTER CONDITION: ___GOOD X FAIR ___POOR

YSTEM OPERATION:

	MON - FRI	SAT	SUN
*PRESENT OPERATION:	______ TO ______	______ TO ______	______ TO ______
*REQUIRED OPERATION:	______ TO ______	______ TO ______	______ TO ______

	HEATING SETPOINTS				COOLING SETPOINTS			
	WEEKDAYS		WEEKENDS		WEEKDAYS		WEEKENDS	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
*PRESENT TEMP:								
*REQUIRED TMP:								

HUMIDIFICATION REQUIREMENTS (RH): ____ HUMIDISTAT LOCATION: _____

SYSTEM SETPOINTS: ✓ MIXED AIR 55 °F, HOT DECK ___ °F, COLD DECK ___ °F
TIME CLOCK: ___ (Y, N) IF YES, IS IT OPERATIONAL ___ (Y, N)

CONTROLS: PNEUMATIC X, ELECTRIC ______, PNEUMATIC/ELEC ______

EQUIPMENT CONDITION: EXCELLENT(E), GOOD(G), POOR(P) T'STAT G
H'STAT — COMPR — DAMPERS G LINKAGES G FANS G SHEAVES G
VALVES G ACTUATORS G BELTS G MIXING BOX G
OTHER___

COMMENTS:
• EXH DMPR (32"X110') DAMAGED
• ALL BUT 1 MZ OPR DISABLED
• COIL VALVE & OPER (REPL)
• CW VALVE (REPL) OPR (OK)
• CONV VALVE (REPL) OPR (REPL)

• IMPROPER PUMP (BOLTS SMALL, ETC)
• SRV LEAKING
• UH RUNNING (TOO HOT) T'STAT LOCKED
• HOT DECK CONTROLLER (ELECTRONIC) SEEMS DEFECTIVE.

Bldg No.: P2350

MECHANICAL EQUIPMENT DATA

EXHAUST FANS:

UNIT NO.	TYPE			CFM	HP	STARTER & CONTROL	SETPOINT
EF 1	CENT	TOILETS	3/8" SP	815	1/6		
EF 2	CENT	MER	1/4" SP	1960	1/3		

FILM #: ________ FRAME #: ________

NOTES: TYPE --> propeller, centrifugal, etc.
STARTER & CONTROL --> momentary, maintained, line v stat, 24 v stat, self contained, etc.

Bldg No.: P-2350

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

HEATING PLANT

PLANT DESCRIPTION: ✓

NUMBER OF UNITS: ___

MAKE & MODEL: 1) SUPPLIED BY CENTRAL PLANT – HTHW & CHW

2) ______

3) ______

EQUIPMENT: ___ BOILER ___ DIRECT FIRED ___ STEAM CONV

TYPE: ___STEAM ___HW ___CAST IRON ___WATER TUBE, FIRE TUBE

FUEL: NAT GAS _____ ELECTRIC _____ OIL _____ OTHER ______

MULTIPLE UNIT OPERATION SEQUENCE:

SERIES ______ PARALLEL ______

BURNER STAGES: ______

FIRING RATE/FUEL: #1: ______ #2: ______

BURNER TYPE: ___POWER: MFR ______ MOD No. ______

BLOWER ____/__/___-____A _____HP @_______CFM

CONTRL ____/__/___-____A

___ATMOS: MFR ______ MOD No. ______

X HOT WATER: SUPPLY SIZE 3" TEMPERATURE 180 PRESSURE ~40 PSI

RETURN SIZE 3" TEMPERATURE 160 PRESSURE ~40 PSI

___STEAM: HEADER SIZE _______ TEMPERATURE _____ PRESSURE ____PSI

RATED CAPACITY: MAX BTUH IN ______

MAX BTUH OUT ______

CONTROLS: TYPE Pneumatic

CONDITION OK

PLANT AUXILIARIES:

PUMPS: HW 1) 208/3/60-3.4 A ~~3/4~~ 1.0 HP

CHW 2) 208/3/60-4.8 A ~~3/4~~ 1.5 HP

COND 1) ____/__/____-____A __________HP

2) ____/__/____-____A __________HP

FANS: 1) ____/__/____-____A __________HP @_________CFM

2) ____/__/____-____A __________HP @_________CFM

3) ____/__/____-____A __________HP @_________CFM

OTHER 1) ____/__/____-____A __________HP

2) ____/__/____-____A __________HP

AUX OPERATING SCHEDULES: (See control schedule)

PUMPS: HW 1) ON_____OFF_____ 2) ON_____OFF_____

COND 1) ON_____OFF_____ 2) ON_____OFF_____

FANS: 1) ON_____OFF_____ 2) ON_____OFF_____ 3) ON_____OFF_____

OTHER: 1) ON_____OFF_____ 2) ON_____OFF_____

AUXILIARY FUEL USED: #2 OIL ______ NAT GAS _____ OTHER ______

Bldg No.: P-2350

GENERAL ENERGY CONSERVATION OPPORTUNITY CHECKLIST

Bldg Name: 280 Adm & Clrm Bldg #: 2350 Contact: __________ Phone #: __________ Surveyed By: DJD Date: __________

ECO TITLE	ANNEX A	DATE	ANNEX B	DATE	COMMENTS
INSULATION	A1		# B01	YES	INCREASE TO R-38
STORM WINDOWS or DOUBLE GLAZING	A2		# B02	YES	
WEATHER STRIPPING and CAULKING	A3		# B03	YES	
INSULATED PANELS	A4		# B04	YES	LOWER PANEL OF VEST. GLAZING
VESTIBULES or REVOLVING DOORS	A5		# B05	NO	EXISTS
LOAD DOCK SEALS (Strip Door or Air Cu)	A6		B06	NO	N/A
REDUCTION of GLASS AREA	A7		B07	YES	SEE B04
REPLACE KITCHEN LIGHT FIXTURES	A8		# B08	NO	N/A
SHUTDOWN DHW or MOD CTRLS (Non FH)	A9		B09	NO	NO DHW
REDUCE LIGHTING LEVELS	A10		# B11	NO	NOT EXCESSIVE
REPLACE INCANDESCENT LIGHTING	A11		# B12	NO	INSIGNIFICANT
USE MORE EFFICIENT LIGHTING SOURCE	A12		# B10	YES	Ext. incandescent
HIGH EFFICIENCY MOTOR REPLACEMENT	A13		B13	YES	AHU & CIRC PUMPS
NIGHT SETBACK/SETUP THERMOSTATS *	A14		# B14	YES	
INFRARED HTRS (Motor Rep Shops & Whse)	A15		# B15	NO	N/A
ECONOMIZER CYCLES (Dry Bulb Type)	A16		# B16	NO	IN PLACE
CONTROL HOT WATER CIRC PUMP *	A17		# B17	NO	N/A
~~FM RADIO CONTROLS~~	~~A18~~		~~B18~~		
RADIATOR CONTROLS	A19		B19	NO	N/A
DECENTRALIZE DHW HTRS (POU Htrs) *	A20		B	NO	NO DHW
HEAT RECLAIM from HOT REFRIG GAS	A21		# B20	NO	N/A
REDUCE AIR FLOW *	A22		# B21	YES	
PREVENT AIR STRATIFICATION *	A23		# B22	NO	NO STRAT
INSTALL TIME CLOCKS	A24		B23	NO	N/A
CHILLER REPLACEMENT	A25		B	NO	N/A
REPLACE ABSORPTION CHILLER	A26		B38	NO	N/A
INSULATE STEAM LINES	A27		B26	NO	N/A
RETURN CONDENSATE	A28		B27	NO	N/A
TRANSFORMER OVERVOLTAGE	A29		B31	YES	
TRANSFORMER LOADING	A30		B30	YES	
REVISE OR REPAIR HVAC CONTROLS	A31		B32	YES	
WASTE HEAT RECOVERY *	A32		B33	NO	
ADD ADDITIONAL LIGHT SWITCHES	A33		B35	NO	ADEQUATE
HVAC INIT/BLDGS WITH SEPARATE BOILERS	A34		# B37		N/A
STANDARD SOLUTIONS for EXT LIGHTS	A35		# B36	NO	
BOILER OXYGEN TRIM CONTROLS	A		B24	NO	N/A
REVISE BOILER CONTROLS	A		B25	NO	N/A
PRE-HEAT DHW	A		B28	NO	NO DHW
HEAT PUMPS	A		# B29	NO	N/A
EMCS	A		B39	YES	HANDLED BY SPECIAL STUDY
HOT WATER RECIRC PUMPS	A		M40,17	—	
HPS STREET LIGHTS	A		M41	—	
ELECTRIC OUTLET INSULATION	A		M42	—	

<*> Denotes ECO's studied by Burns & McDonnel
<#> Denotes ECO's common to Military Family Housing

JOB FT CARSON EEAP UPDATE

SHEET NO. ________ OF ________

CALCULATED BY AJN DATE 9/92

CHECKED BY ________ DATE ________

SCALE ________

E M C ENGINEERS, INC.

Denver • Atlanta • Germany

P-2350

HTHW

Aquastat T12 set at 180°F

HTHW 2-way control valve is 1/2"

Actuator is Type A

HW

HW pump - Century AC Motor H25B

1 HP 208-230/460V; 3.4-3.4/1.7 Amp

Armstrong pump Mod. H63 / SN. 7806

Hot Deck 3-way control Valve - 1 1/2"

Actuator is Type B

CW

CW pump - Wagner Motor 1 1/2 HP

Armstrong pump Mod. H63 / S.N. 7512

220/440 V; 4.8/2.4A

Air Side Actuators

O.A./R.A. Damper Act. - Type F

Relief Damper Act. - Type F1 (Disabled)

7 Zones on MZU:

Zones 1, 3, 4, & 6 actuators are connected to linkages.
All are operable except #6. Zone T-STATS drive actuators. - OK.

Zones 2, 5, & 7 actuators are disconnected from linkages
Zones 2 & 5 T-STATS are disabled; Zone 7 T-STAT - OK.

JOB FT CARSON REAP UPDATE

SHEET NO. ______ OF ______

E M C ENGINEERS, INC.

Denver • Colorado Springs • Atlanta • West Germany

CALCULATED BY AJN DATE 9/92

CHECKED BY ______ DATE ______

SCALE ______

B2350

Multizone AHU w/ 7 zones.

Aquastat T12 set @ 180. Htg valve V1 has fixed set point, integral to valve actuator, set @ 170 °F. Could not stroke V1 because temp range is 150-230F. HWT = 72°F.

Could not locate T9 (OA ⊕.)

T8 setpoint is 62F T11 setpoint is 75F

CHW CV V3 is fixed setpoint of 48, stroked valve by changing setpoint.

There is no heat in the bldg @ time of survey (HW pump is off)

DP on CHW system has been removed & replaced w/ a gauge.

Fan has H-O-A switch and is running in the auto position.

HW pump is not operated by T8 or T11 (~~stroke~~ stroked both setpoints, pump did not turn off.)

Stroked T8 and CHW pump P1 turned off and V3 closed.

Stroked T11 & dampers did not move.

Could not find T2. Since there is no heat on bldg, could not check operation of hot deck valve.

Exh. damper is not connected to actuator. It is manually set for minimal exh. air.

**** FMEA SIMILAR BUILDINGS SURVEY FORM ****

9/92 AJN

GE[illegible]AL BUILDING DATA

BLDG #: 1853(P) BLDG NAME: Bn Admin & Clrm/RR DATE: ~~7-13-85~~ JOB #: 124
SURVEYED BY: ~~RL/RL~~ BLDG CONTACT: Lt. Hartiage TELEPHONE EXT: 4436
BLDG USE: Offices/Classes # FLOORS: 1.1 # PEOPLE: 35 BLDG AREA: 22900 SF

BLDG OCCUPANCY: S M T W Th F S 0500 TO 1700
S M T W Th F S ____ TO ____

T'STAT SETTING: HTG: 68/— AUTO SETBACK: N / Y: —/—
CLG: 75/—
Temperature,Future,inside,Occupied: 65/78 Temp Present: 68
Temperature,Future,inside,Unoccupied: 55/— AirChange/hR: .53

ARCHITECTURAL

	AREA	U-value	UA
WALL	7890	.091	718.0
GLASS	545	1.176	641
ROOF	17,376	.0468	813
FLOOR	700	.860	602.0
SUM	26,511	—	2,774

Avg. Floor-Ceiling Height: 10.0' Floor type: Slab Insulated: Y/N
Window frame type: Alum Wood Operable sections: Y / N
W[illegible]w size: ____ x ____ SP DP CURT Infiltration L M H
[illegible]ry doors: 8 # OH Doors: 0 % of Area Conditioned: 100

LIGHTING: Type: Fluorescent Watts/SF: 1.6 Util Frac: —

ELECTRICAL EQUIP: KW/Unit: ____ #Units: ____ Util Frac: ____

DHW: TYPE: ~~NG/ELEC/CONV~~ Supply Temp: ____ GAL/Person-Day: ____
AFUE: ____%

MECHANICAL

	HEATING	COOLING
Primary System:	HTHW → HW Conv	CHW
Fuel:	NaG (CP)	NaG (CP)
Capacity:	715.5 KBTUH	
est.Peak Del.Effic:	63.1%	52.12%
Months ON:	8	4
Hours ON:	5808	2952
AHUs Hp:	~~14~~ 15	~~8~~ (10 HP from Nameplate)
cfm:	24,870	13,670
Min OA:	56%	20%
Economizer:	→	Dumb

MISC:
- 24 hr/Gaurd on Duty (3 men)
- 1-SZU for Rifle Range is heating only, 11200 CFM @ 5HP, 100% OA.

JOB FT CARSON EEAP UPDATE

SHEET NO. ______ OF ______

E M C ENGINEERS, INC.

Denver • Colorado Springs • Atlanta • Germany

P-1853

CALCULATED BY AJN DATE 9/92

CHECKED BY ______ DATE ______

SCALE ______

Control set pts

T-2 - 74°F Operable

T-12 - 58°F Operable

T-14 - 62°F Unable to operate

O.A. dampers

Linkage is removed (18")

Controlled from Mixed Air Sensor & setpoint on Actuator.

HW Pumps

No. 2 Switched OFF

No. 3 " "

Relief Air Duct is disconnected & capped off w/ polyethylene at the flex joint.

HW Pump No. 3 is 1/2 HP serves AHU No. 2

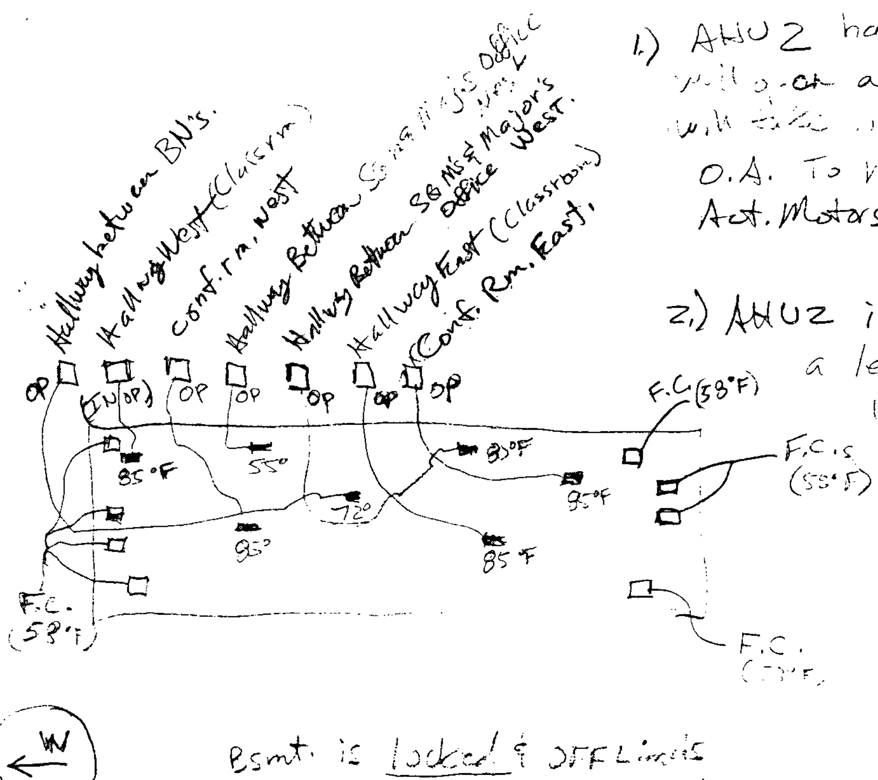
Verified Control pts from Control Schematics in MER. The following differences exist:

1.) AHU 2 has an extra Actuator damper that will open a damper to the MER. It will take [illegible] from MER & mix w/ O.A. To maintain a desired M.A. setpt.

Act. Motors = MA 405 (MER Air)

= Type B on O.A.

2.) AHU 2 is not used. Firing range is a lead & asbestos hazard. Has not been used for a couple of years. Currently locked up.



[illegible]	
?	Converter
(A) 20°F	(A) 20°F
(B) 20°F	(B) 20°F

Bsmt. is locked & OFF Limits

Lead & asbestos contamination.

**** FMEA SIMILAR BUILDINGS SURVEY FORM ****

9/92 AJN

ENERAL BUILDING DATA

LDG #: 2060B BLDG NAME: BnAdmin & Clrm/RR DATE: ~~2-13-85~~ JOB #: 124
URVEYED BY: ~~NW/AM~~ BLDG CONTACT: SP5 Merrill TELEPHONE EXT: 4933
LDG USE: Offices/Classes # FLOORS: 1.1 # PEOPLE: 60 BLDG AREA: 22900 SF

LDG OCCUPANCY: S M T W Th F S 0500 TO 1700
S M T W Th F S ____ TO ____

'STAT SETTING: HTG: 68/— AUTO SETBACK: N / Y: —/—
CLG: 75/—
emperature,Future,inside,Occupied: 65/78 Temp Present: 68
emperature,Future,inside,Unoccupied: 55/— AirChange/hR: .53

RCHITECTURAL

	AREA	U-value	UA
WALL	7890	.091	718.0
GLASS	545	1.176	641
ROOF	17,376	.0468	813
FLOOR	700	.860	602.0
SUM	26,511	—	2,774

vg. Floor-Ceiling Height: 10.0' Floor type: Slab Insulated: Y/N
indow frame type: Alum Wood Operable sections: Y / N
ir w size: ____ x ____ SP DP CURT Infiltration L M H
y doors: 8 # OH Doors: 0 % of Area Conditioned: 100

IGHTING: Type: Fluorescent Watts/SF: 1.6 Util Frac: —

LECTRICAL EQUIP: KW/Unit: ____ #Units: ____ Util Frac: ____

HW: TYPE: ~~NG/ELEC/CONV~~ Supply Temp: ____ GAL/Person-Day: ____
AFUE: ____ %

ECHANICAL

	HEATING	COOLING
Primary System:	HTHW → HW Conv	CHW
Fuel:	NaG (CP)	NaG (CP)
Capacity:	715.5 KBTUH	
est.Peak Del.Effic:	63.1%	52.12%
Months ON:	8	4
Hours ON:	5808	2952
HUs Hp:	14	9
cfm:	24,870	13,670
Min OA:	56%	20%
Economizer:	→	Dumb

ISC:
- 24 hr Gaurd on Duty (~~3~~ 2 men)
- 1-SZU for Rifle Range is heating only, 11,200 cfm @ 5HP, 100% OA.
- OA Stat setpoint = 85°
- Roof has R-19

AGE 1 of 1

JOB FT CARSON EEAP UP DATE

SHEET NO. ______ OF ______

E M C ENGINEERS, INC.

Denver • Atlanta • Germany

CALCULATED BY AJN DATE 9/92

CHECKED BY ______ DATE ______

SCALE ______

P-2060

Similar To P-1853 (see Control Schematics for 1853)

Westinghouse
Circular Chart Temperature Recorders:
1 for HW & 1 for CW

T14 set at 75° (HW pump)

DP1 is disconnected.

V4 is set at 50°F (per marking on valve) CW sensor is disconnected

T12 set at 58°F (CW pump)

Mixed Air Temp. set at 60°F

Barber Colman Controller	
?	Converter
(A) 95°	(A) 98°
(B) 70°	(B) 70

AHU 1
Century Motor
7.5 HP at 200-208V; 23.0-23.0A
6-330778-01

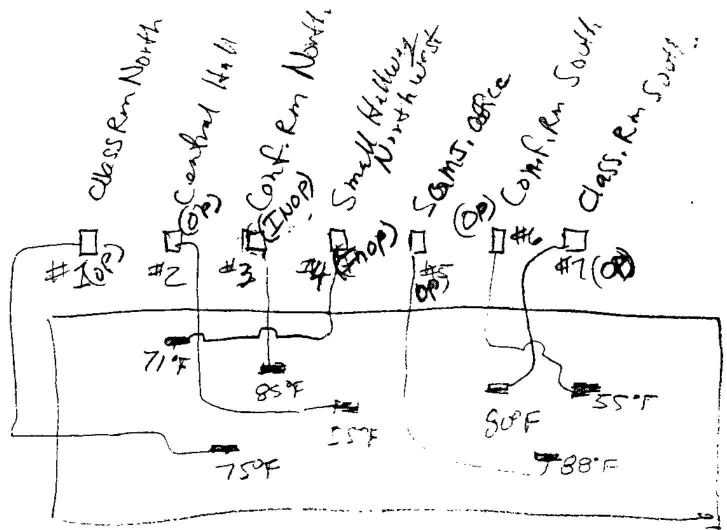
AHU #2
Century Motor
5 HP 200/208V
16.0/16.0A.

CW pump
1½ HP Marathon
208-220/440V;
4.8/12.4A

HW pump
5 HP 208-220/440V; Marathon
[illegible]/6.[illegible]A

HW Pump for AHU #2 (Firing Range)
1/3 HP (Dayton)

2" C.V. for AHU #2 3-Way w/ Act. No. MP-387-0-0-1
& M4 actuator is MP-367-0-0-1.



Firing Range area has been cleared of lead & asbestos. Is being converted to office space. T-STAT is inoperable. (see sketch on back side of page.)

AHU #2 has same damper actuators as found in P-1853.

**** FMEA SIMILAR BUILDINGS SURVEY FORM ****

9/92 AJN

EN L BUILDING DATA

L .: 2160(D) BLDG NAME: Bn Admin & Clrm/RR DATE: ~~2-13-85~~ JOB #: 124
URVEYED BY: ~~HW/AM~~ BLDG CONTACT: SFC KENT TELEPHONE EXT: ____
LDG USE: Offices/Classes # FLOORS: 1.1 # PEOPLE: ____ BLDG AREA: 22900 SF

LDG OCCUPANCY: S M T W Th F S 0600 TO 1700
S M T W Th F S ____ TO ____

'STAT SETTING: HTG: 68/— AUTO SETBACK: N / Y: —/—
CLG: 76/—
emperature,Future,inside,Occupied: 65/78 Temp Present: 68
emperature,Future,inside,Unoccupied: 55/— AirChange/hR: .53

RCHITECTURAL ✓

	AREA	U-value	UA
WALL	7890	.091	718.0
GLASS	545	1.176	641
ROOF	17,376	.0468	813
FLOOR	700	.860	602.0
SUM	26,511	—	2,774

vg. Floor-Ceiling Height: 10.0' Floor type: Slab Insulated: Y/N
indow frame type: Alum Wood Operable sections: Y / N
ir size: ____ x ____ SP DP CURT Infiltration L M H
y doors: 8 # OH Doors: 0 % of Area Conditioned: 100

IGHTING: ✓ Type: Fluorescent Watts/SF: 1.6 Util Frac: —

LECTRICAL EQUIP: KW/Unit: ____ #Units: ____ Util Frac: ____

HW: TYPE: ~~NG/ELEC/CONV~~ Supply Temp: ____ GAL/Person-Day: ____
AFUE: ____ %

ECHANICAL

	HEATING	COOLING
Primary System:	HTHW → HW Conv	CHW
Fuel:	NaG (CP)	NaG (CP)
Capacity:	715.5 KBTUH	
est.Peak Del.Effic:	63.1%	52.12%
Months ON:	8	4
Hours ON:	5808	2952
HUs Hp:	~~14~~ 10.5	~~8~~ 7.5
cfm:	24870	13,670
Min OA:	56%	20%
Economizer:	→	Dumb

ISC: ✓
- 24 hr Gaurd on Duty (2 men)
- 1-SZU for Rifle Range is Heating Only; 11,200 CFM@ ~~2~~ 3.0 HP, 100% OA.

CW pump = 1.5 HP
HW pump = 1.5 HP

GE 1 of 1

JOB FT CARSON EEAP UPDATE

SHEET NO. ______ OF ______

E M C ENGINEERS, INC.

Denver • Atlanta • Germany

CALCULATED BY AJN DATE 9/92

CHECKED BY ______ DATE ______

SCALE ______

P-2160

Same as P-1853

AHU#1

Century Motor
7.5HP (Same as 2060)

AHU#2

AJAX Elect. Motor CO.
3.0HP 230/460V; 9.0/4.5A

CW Pump

Marathon. 1.5 HP
(same as P-2060)

HW Pump

Boldor. 1.5 HP
208-230/460V
4.6-4.2/2.1A

HW Pump for HV unit (Firing Range)

Bell & Gossett
1 HP
230/460V
4.6/2.3A

T14 set at 70°F

T12 set at 58°F

M.A. Temp. set at 60°F

DP1 connected

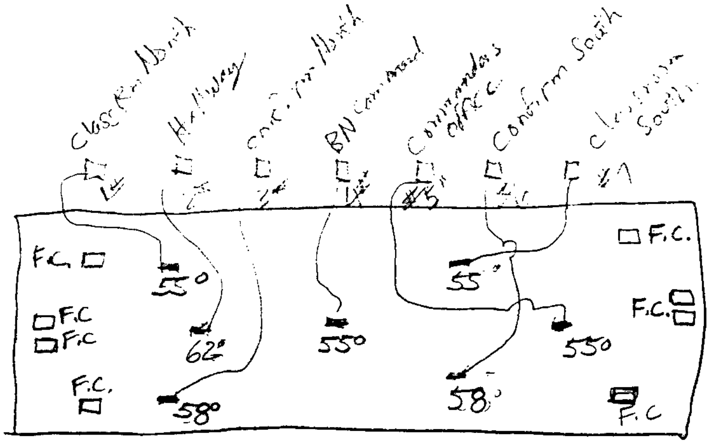
All controls connected as per control diagram; except there is no relief damper & actuator.

AHU#2 has same damper actuators as P-1853 except has an extra O.A. damper Act. MP-461-0-0-1 To Help move damper.

Controller Set pts	
(?)	Converter
(A) 66°	(A) 60°
(B) 60°	(B) 60°

Lead / Asbestos abatement is in progress in Basement Firing range. No access at current time.

All 7 zone damper Actuators are MP-2150-500-2-2 Barber-Colman Electric.



All zone Actuators are operable.

Fan Coil units are the same as Bldg. P-1853

**** FMEA SIMILAR BUILDINGS SURVEY FORM ****

9/92
AJN

GE[illegible]AL BUILDING DATA

BLDG #: 2352 (P) BLDG NAME: ZBn Admin & Clrm DATE: ~~2-13-85~~ JOB #: 124
SURVEYED BY: ~~KW/AM~~ BLDG CONTACT: ______ TELEPHONE EXT: ______
BLDG USE: OFFICES # FLOORS: 1 # PEOPLE: ___ BLDG AREA: 18672 SF

BLDG OCCUPANCY: S M T W Th F S 0600 TO 1730
S M T W Th F S ______ TO ______

T'STAT SETTING: HTG: 68 / — AUTO SETBACK: N / Y: ___ / ___
CLG: 78 / —
Temperature, Future, inside, Occupied: 65/78 Temp Present: 68
Temperature, Future, inside, Unoccupied: 55/— AirChange/hR: .04

ARCHITECTURAL

	AREA	U-value	UA
WALL	7890	.091	721
GLASS	545	1.176	641
ROOF	17,376	.0468	813
FLOOR	547	.860	470
SUM	26,511	—	2,774

Avg. Floor-Ceiling Height: 10' Floor type: Slab Insulated: Y/N
Window frame type: Alum Wood Operable sections: Y / N
Wi[illegible]w size: ___ x ___ SP DP CURT Infiltration L M H
[illegible]ry doors: 8 # OH Doors: 0 % of Area Conditioned: 100

LIGHTING: Type: Fluorescent Watts/SF: 1.6 Util Frac: ____

ELECTRICAL EQUIP: KW/Unit: ____ #Units: ____ Util Frac: ____

DHW: TYPE: ~~NG/ELEC/CONV~~ Supply Temp: ____ GAL/Person-Day: ____
AFUE: ____ %

MECHANICAL

	HEATING	COOLING
Primary System:	HTHW → HW Conv	CHW
Fuel:	NaG (CP)	NaG (CP)
Capacity:	[illegible] KBTUH	
est. Peak Del. Effic:	63.1%	52.1%
Months ON:	8	4
Hours ON:	5808	2952
AHUs Hp:	~~7.5~~ 10	~~7.5~~ 10
cfm:	18,210	18,210
Min OA:	20%	20%
Economizer:	→	OA / Set = 80°F

MISC:
- 7 zone MZU
- CW pump - 1.5 HP
- HW pump - 3/4 HP

PAGE 1 of 1

E M C ENGINEERS, INC.

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JOB FT CARSON EEAP UPDATE

SHEET NO. ______ OF ______

CALCULATED BY AJN DATE 9/92

CHECKED BY ______ DATE ______

SCALE ______

P-2352

See Control Schematics for P-2350

CW pump

Wagner

1 ½ HP

208-220/440 V

4.8-4.8/2.4A.

HW Pump

Baldor

3/4 HP

208-230/460 V

3.2-3.0/1.5A

T12 set at 160°F

T8 (CW pump) set at 60°F

T11 (Economizer) set at 85°F

V1 set at 150°F

Hot Deck Valve.

Barber-Colman Controller

(A) 80°F

(B) 65°F

MultiZone AHU

Century 10HP

200/208 V

29.0/29.0 A

NOT-START Just a Resistor

#7 West. Conf rm. (OP)

#4 Hallway (NOP)

#6 SW conf rm (OP)

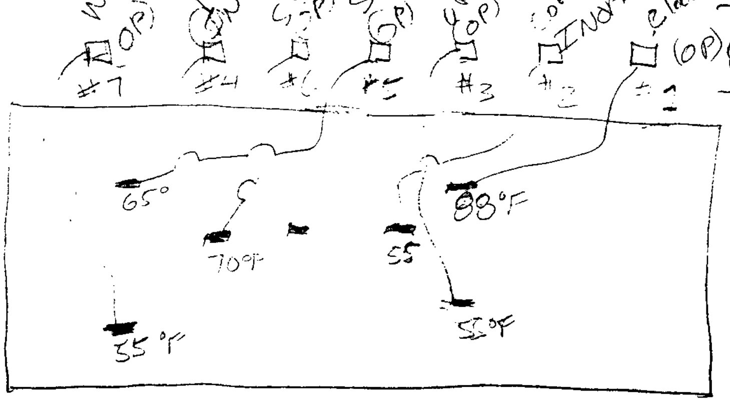
#5 SW office Area (OP)

#3 Office Area East (OP)

#2 Conf. rm. East (NOP) (Linkage has been disconnected) damper set in open position)

#1 classroom (OP)

Zone actuators are electric Barber-Colman MU-2270-0-0-1



← W

**** FMEA SIMILAR BUILDINGS SURVEY FORM ****

9/92 AJN

GE[illegible]L BUILDING DATA

BL[illegible] #: 2100(P) BLDG NAME: Bn Adm & Clrm DATE: ~~2-13-85~~ JOB #: 124
SURVEYED BY: ~~RA/PK~~ BLDG CONTACT: Elmore TELEPHONE EXT: 2288
BLDG USE: Offices/Classes # FLOORS: 1 # PEOPLE: 25 BLDG AREA: 12339 SF

BLDG OCCUPANCY: S M T W Th F S 0700 TO 1630
S M T W Th F S ____ TO ____

T'STAT SETTING: HTG: 72 / — AUTO SETBACK: N / Y: ___ / ___
CLG: 75 / —
Temperature,Future,inside,Occupied: 65/78 Temp Present: 70
Temperature,Future,inside,Unoccupied: 55/— AirChange/hR: .53

ARCHITECTURAL

	AREA	U-value	UA
WALL	5217	0.091	474.5
GLASS	327	1.176	385
ROOF	11,482	0.0468	537
FLOOR	444	.860	381.8
SUM	12,470	—	1,778

Avg. Floor-Ceiling Height: 9.0 Floor type: Slab Insulated: Y/N
Window frame type: Alum Wood Operable sections: Y / N
Wi[illegible] size: ____ x ____ SP DP CURT Infiltration L M H
[illegible]y doors: 2 # OH Doors: 0 % of Area Conditioned: 100

LIGHTING: Type: Fluorescent Watts/SF: 1.2 Util Frac: ____

ELECTRICAL EQUIP: Office KW/Unit: ____ #Units: ____ Util Frac: ____

DHW: TYPE: ~~NG/ELEC/CONV~~ Supply Temp: ____ GAL/Person-Day: ____
AFUE: ____ %

MECHANICAL

		HEATING	COOLING
	Primary System:	HTHW →	CHW
	Fuel:	NaG (CP)	NaG (CP)
	Capacity:	672 KBTUH	
	est.Peak Del.Effic:	63.1%	52.1%
	Months ON:	8	4
	Hours ON:	5808	2952
AHUs	Hp:	~~5~~ 10	~~5~~ 10
	cfm:	13,400	11000
	Min OA:	16%	16%
	Economizer:	→	Dumb

MISC:
24 hr Staff Duty, 7days – 2 men

PAGE 1 of 1

JOB FT CARSON EEAP UPDATE

SHEET NO. ______ OF ______

E M C ENGINEERS, INC.

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CALCULATED BY AJN DATE 9/92

CHECKED BY ______ DATE ______

SCALE ______

P-2700

Multizone Unit

10 HP U.S. Elect. Motor
230/460 V;
27.4/13.7 A

CW Pump

3 HP. U.S. Elect. Motor
200V; 10.0 A.

R.A. Fan

Century Gould
3 HP
200-208V
10.4-10.4 A.

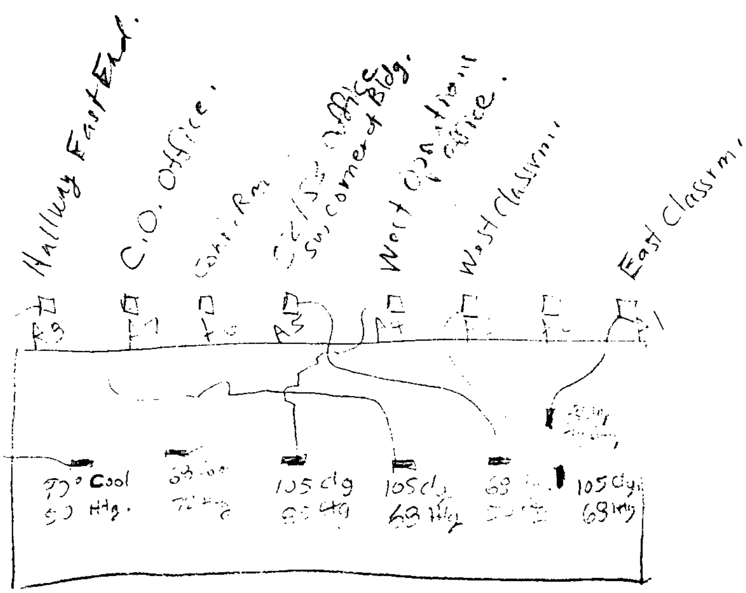
2 - HW pumps (for Pumps CP1 & CP1A)
3 HP. U.S. Elect. Motor
200V; 10.0 A

DP-1 in place.
85 gpm Annubar Flow meter Station.

TE-14 Set at 49°F
controls V-8 CW Valve.
(2-way) on Main Return.

Raised & Lowered setpts on TE-12 & TE-13 & could not make CW pump. shut off. CW pump runs continuously during cooling season.

AHU was not running. I reset the motor control to Start the unit, but the motor produced a loud buzzing noise & did not move the fan. I was unable to check the damper actuation. All linkages are hooked up. General appearance of the MER equipment is very good.



__EMEA_SURVEY_OBSERVATIONS__

3/29/93 - OM

GENERAL BUILDING DATA

BLDG #: 2357 BLDG NAME: GYMNASIUM JOB #: 124
SURVEYED BY: TEAM L DATE: ~~10/25/84~~ BLDG CONTACT: ______
CONTACT TELEPHONE NUMBER: ______ BLDG USAGE: RECREATION
TOT BLDG AREA: 26,198 SF # OF FLOORS: 2 # OF PEOPLE: ______

BUILDING OCCUPANCY: ✓

MON - FRI:	0600 TO 2200	~~FIRST SHIFT~~:	600
SATURDAY:	0600 TO 2200	~~SECND SHIFT~~:	300
SUNDAY:	0600 TO 2200	~~THIRD SHIFT~~:	150
HOLIDAYS:	— TO —	HOLIDAYS:	—

ENVIRONMENTAL CONDITIONS:

	HEATING SETPOINTS				COOLING SETPOINTS			
	WEEKDAYS		WEEKENDS		WEEKDAYS		WEEKENDS	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
PRESENT T'STAT:								
REQUIRED T'STAT:								

THERMOSTAT LOCATION(S): SEE SCHED NEXT SHEET (3 of 12)
HUMIDIFICATION REQUIREMENTS (RH): ____ H'STAT LOCATION(S): ______

LIGHTING: ✓

	AREA (SF)	LAMP TYPE	#LMPS	W/SF	SCHEDULE	
ZONE 1)	15,283	FL/MV		1.298	ON 0600	OFF 2200
ZONE 2)	12,828	FL/MV		1.367	ON 0600	OFF 2200
3)					ON	OFF
4)					ON	OFF

DATA SOURCE: ✓ OBSERVATION ___ASHRAE ___OTHER
SEE ATTACHED SCHEDULE? ✓ Y ___N

ELECTRIC EQUIPMENT:

	AREA (SF)	TYPE	(KW)	W/SF	SCHEDULE	
1)		INSIGNIFICANT			ON	OFF
2)					ON	OFF
3)					ON	OFF
4)					ON	OFF

DATA SOURCE: ✓ OBSERVATION ___ASHRAE ___OTHER
SEE ATTACHED SCHEDULE? ___Y ___N

INTERNAL MASS: MATERIAL: CONC BLK PAR'N ESTIMATED MASS: L (L, M, H)

INFILTRATION: LOCATION(S): OA DAMPERS, ENTRY DOORS

ESTIMATED RATE: M (L, M, H) or
_____AIR CHANGES or
_____CFM/LIN FT CRACK

*** FMEA SURVEY OBSERVATIONS ***

GENERAL BUILDING DATA GROSS

CONSTRUCTION: ✓

WALLS:

	CONSTRUCTION COMPONENT	WIDTH	HEIGHT	AREA (SF)	U-VALUE
N:	EXTWALL 102	133'-5½"	21'-8"	2891.6	0.0977
S:	"	48'-1½"	34'-0"	1636.25	"
E:	"	132'-0	34'-0"	4488.0	"
W:	"	63'-10"	15'-0"	957.5	"

ROOFS:

CONSTRUCTION COMPONENT	WIDTH	HEIGHT	AREA (SF)	U-VALUE
ROOF 42	132'-0	89'-5"	11,799.6	0.110

WINDOWS:

	AREA (SF)	TYPE	SP	DP	DRAPES
N:					
S:	390	¼" P	✓		NO
E:					
W:					

FLOOR TYPE: ✓ SLAB ___ CRAWL SPACE ___ BASEMENT ___ OTHER*

AREA: 11,799.6SF

PERIMETER: 377.42 LF INSULATION? ✓ Y ___ N 2 IN TO 24" DEPTH

SPECIAL AREAS: ____________

ADDITIONAL NOTES: ____________

FILM #: ________ FRAME #: ____________

SKETCHES:

* Specify in "Additional Notes"

Bldg No.: 2357 ZONE 1

*** FMEA SURVEY OBSERVATIONS ***

GENERAL BUILDING DATA

CONSTRUCTION: ✓

WALLS:

	CONSTRUCTION COMPONENT	WIDTH	HEIGHT	AREA (SF)	U-VALUE
N:					
S:	EXTWALL 102	85'-4"	34'-0"	2901.33	0.0977
E:	"	41'-10"	34'-0"	1422.33	"
W:	"	110'-0"	34'-0"	3740.00	"

ROOFS:

CONSTRUCTION COMPONENT	WIDTH	HEIGHT	AREA (SF)	U-VALUE
ROOF 42	110'-0	85'-4"	9386.67	0.110

WINDOWS:

	AREA (SF)	TYPE	SP	DP	DRAPES
N:					
S:					
E:					
W:					

FLOOR TYPE: ✓ SLAB ___ CRAWL SPACE ___ BASEMENT ___ OTHER*
AREA: 9386.67 SF

PERIMETER: 237'-2' LF INSULATION? ✓ Y ___ N 2 IN TO 24" DEPTH

SPECIAL AREAS: ____________

ADDITIONAL NOTES: THERMOSTAT SCHEDULE

ZONE 1				ZONE 2		
N.W.	SET - 55°	READS - ?		SAUNA COOL: OFF	SET - 80°	READS - 70°
N.E.	" 67	" 72		WEIGHT ROOM	" 66°	" 68°
S.W.	" 82°	" 70°		LOBBY	" 78°	" 73°
S.E.	" 57°	" 70°				

FILM #: ________ FRAME #: ____________

SKETCHES:

ZONE 1 CEILING TEMP = 78°

* Specify in "Additional Notes"

Bldg No.: 2357 ZONE 2

***** FMEA SURVEY OBSERVATIONS *****

GENERAL BUILDING DATA

LIGHTING SCHEDULE ✓ Page ___ of ___

AREA: ZONE 1 (A) MAIN 11,800 SF ZONE 2 (B) MEZZ 9387 SF
(A) 132'-0" X 48'-1½" (B) 85'-4" X 63'-10
+ 85'-4" X 63'-10

DATA SOURCE: ✓ DRAWINGS ✓ SURVEY TOUR

Mark	#lamps	W/Fix	#Fix	Flr #	Comments
F	1	51	27	A	LOCKER RMS
I	1	50	15	A	"
F	2	102	20	A	WEIGHT/EXCERCISE RM
F	2	102	4	A	RACQUETBALL COURTS
MV	1	400	10	A	"
MV	1	400	3	A	SQUASH/HANDBALL COURT
F	2	102	7	A	HALLWAYS
F	1	51	1	A	"
F	2	102	3	A	LOBBY
F	1	51	1	A	"
F	2	102	3	A	OFFICE
F	1	51	6	A	LAUNDRY/JANITOR
MV	1	400*	21	B	BASKETBALL GYM
F	2	102	32	B	"

(A) TOTAL: 15,283 Watts/ 11,800 SF= 1.295 W/SF

(B) TOTAL: 12,828 Watts/ 9387 SF= 1.367 W/SF

ADDITIONAL NOTES: *APPROX 35% OF THESE LIGHTS HAVE BEEN DOWN-GRADED TO LOWER WATTAGE LAMPS. FOR PURPOSES OF THIS SURVEY, IT IS ASSUMED THEY ARE 100 WATT UNITS.

*** FMEA SURVEY OBSERVATIONS ***

GENERAL BUILDING DATA

MISCELLANEOUS BASE LOADS:

DOMESTIC HOT WATER:

MANUFACTURER & MODEL ____

FUEL SOURCE ___ NAT GAS ___ ELEC ___ OIL ___ STM GEN ✓ OTHER*

SUPPLY TEMPERATURE 140 °F, DISTANCE FROM HEATER Ø FT

INPUT ______ RECOVERY RATE _______ OPERATING SCHEDULE ___________

EXTERIOR LIGHTING:

TYPE INC NO 9 SCHEDULE ___________ CONTROL SW

TYPE ______ NO ___ SCHEDULE ___________ CONTROL ________

TOTAL KW 0.9

FUNCTION OF LIGHTS ___ SECURITY ___ PARKING LOT ✓ ENTRY

___ OTHER*

ADDITIONAL COMMENTS: DHW GENERATED BY HTHW FROM CENTRAL PLANT. 3 gpm, Est. 1/6 hp.

FILM #: ______ FRAME #: ______

ADDITIONAL SKETCHES:

* Specify in "Additional Comments"

Bldg No.: 2357 ZONES 1 & 2

__FMEA_SURVEY_OBSERVATIONS__

MECHANICAL_EQUIPMENT_DATA

AIR HANDLING UNITS:
MANUFACTURER __TRANE__________ MODEL No.__________________
AHU NUMBER: _1__ AHU TYPE: __MULTIZONE______________
LOCATION: _MEZZ MER______ SPACE SERVED: ZONE 1__________

FAN DATA:
SUPPLY FAN HP: 5 SUPPLY CFM: 8140 STATIC PRESS: 0.65
RETURN FAN HP: — RETURN CFM: — STATIC PRESS: —
EXHAUST FAN HP: — EXHAUST CFM: — STATIC PRESS: —
MOTOR STARTER: MNT __ MOM __. SWITCH: P.B. __ H.O.A. ✓ DISCON __

COILS:
HEATING: HW __ STM ✓ DIRECT FIRED --> NG __ OIL __ ELC__ OTHER __
REPL VALVE & OP COOLING: CW ✓ DX __. FROM CHILLER CENTRAL FROM DX UNIT _______
NO REHEAT: # OF COILS ___ TYPE _____. RECOOL: # OF COILS ___ TYPE ____
NO HUMIDITY: STM __ SPRAY __ ELC __. HW/CW COIL VALVES: 2 WAY ✓, 3 WAY __

DAMPERS:
O.A. DAMPER: Y (Y, N), IF YES, FIXED 20%, MODULATING —% TO —%
R.A. DAMPER: Y (Y, N), IF YES, FIXED 100%, MODULATING —% TO —%
E.A. DAMPER: N (Y, N), IF YES, FIXED —%, MODULATING —% TO —%
ECONOMIZER: ~~N~~ (Y, N), IF YES, OA — RA — ENTHALPY —
OA LEAKAGE: ________% IF NO, CAN ECONOMIZER BE ADDED ~~YES~~____
3 zone ea with actuators Type F4 (op)
FILTER CONDITION: ___GOOD ___FAIR ✓ POOR .58 ΔP/THROW-AWAY

SYSTEM OPERATION: MON - FRI SAT SUN
*PRESENT OPERATION: ______ TO _____ _____ TO _____ _____ TO _____
*REQUIRED OPERATION: _____ TO _____ _____ TO _____ _____ TO _____

	HEATING SETPOINTS				COOLING SETPOINTS			
	WEEKDAYS		WEEKENDS		WEEKDAYS		WEEKENDS	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
*PRESENT TEMP:	_____	_____	_____	_____	_____	_____	_____	_____
*REQUIRED TMP:	_____	_____	_____	_____	_____	_____	_____	_____

HUMIDIFICATION REQUIREMENTS (RH): ____ HUMIDISTAT LOCATION: _____

SYSTEM SETPOINTS: (Fixed) MIXED AIR 58 °F, HOT DECK ___ °F, COLD DECK ___ °F
TIME CLOCK: N (Y, N), IF YES, IS IT OPERATIONAL ___ (Y, N)
Smart Economizer set @ 80°F; ~~Also~~
CONTROLS: PNEUMATIC ______, ELECTRIC ✓, PNEUMATIC/ELEC ______
1" STM VLV (OP) Act. Type F1
EQUIPMENT CONDITION: EXCELLENT(E), GOOD(G), POOR(P) T'STAT P
H'STAT — COMPR — DAMPERS G LINKAGES G FANS G SHEAVES G
VALVES P ACTUATORS P BELTS G MIXING BOX G
OTHER___

COMMENTS: STEAM SUPPLY VALVE & STEAM TRAP LEAK THRU EVEN @ SHUTDOWN. OA & RA DAMPERS DO NOT CHANGE POSITION WHEN UNIT IS TURNED OFF. SEE M-6 FOR STRATEGY.

--> Disregard if the item is the same as the GENERAL BUILDING DATA.

Bldg No.: 2357____

__FMEA_SURVEY_OBSERVATIONS__

MECHANICAL_EQUIPMENT_DATA

AIR HANDLING UNITS:
MANUFACTURER __TRANE__________ MODEL No.________________
AHU NUMBER: _2__ AHU TYPE: _DRAW THRU__REHEAT SYSTEM___
LOCATION: MEZZ MER________ SPACE SERVED: ZONE 1 (Squash & Handball courts)

✓
FAN DATA:
SUPPLY FAN HP: 7.5 SUPPLY CFM: 14,235 STATIC PRESS: .75
RETURN FAN HP: — RETURN CFM: — STATIC PRESS: —
EXHAUST FAN HP: — EXHAUST CFM: — STATIC PRESS: —
MOTOR STARTER: MNT __ MOM __. SWITCH: P.B. __ H.O.A. ✓ DISCON __

COILS: 3/4" (w/BAKWAY)
HEATING: HW __ STM ✓ DIRECT FIRED --> NG __ OIL __ ELC__ OTHER __
NO COOLING: CW __ DX __. FROM CHILLER _________, FROM DX UNIT _______
REHEAT: # OF COILS 4 TYPE STM. RECOOL: # OF COILS ___ TYPE ____
NO HUMIDITY: STM __ SPRAY __ ELC __. HW/CW COIL VALVES: 2 WAY __, 3 WAY __
4 act. on stm coil vlvs (1/2") Type J; one broken; others are "UN" (unable to move actuators)

DAMPERS:
O.A. DAMPER: Y (Y, N), IF YES, FIXED —%, MODULATING 0% TO 100%
R.A. DAMPER: Y (Y, N), IF YES, FIXED —%, MODULATING 10% TO 100%
E.A. DAMPER: N (Y, N), IF YES, FIXED —%, MODULATING —% TO —%
ECONOMIZER: N (Y, N), IF YES, OA — RA — ENTHALPY —
OA LEAKAGE: _______% IF NO, CAN ECONOMIZER BE ADDED __YES?__
Face & Bypass dampers = Act. Type = F1 (OP); O.A. damper = Act. Type F5
FILTER CONDITION: ___GOOD ___FAIR ✓ POOR .58" ΔP THROW-AWAY

SYSTEM OPERATION: MON - FRI SAT SUN
*PRESENT OPERATION: ______ TO _____ _____ TO _____ _____ TO _____
*REQUIRED OPERATION: _____ TO _____ _____ TO _____ _____ TO _____

	HEATING SETPOINTS				COOLING SETPOINTS			
	WEEKDAYS		WEEKENDS		WEEKDAYS		WEEKENDS	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
*PRESENT TEMP:	_____	_____	_____	_____	_____	_____	_____	_____
*REQUIRED TMP:	_____	_____	_____	_____	_____	_____	_____	_____

HUMIDIFICATION REQUIREMENTS (RH): ____ HUMIDISTAT LOCATION: _____

SYSTEM SETPOINTS: MIXED AIR ___°F, HOT DECK ___°F, COLD DECK ___°F
TIME CLOCK: N (Y, N), IF YES, IS IT OPERATIONAL ___ (Y, N)

CONTROLS: PNEUMATIC ______, ELECTRIC ✓, PNEUMATIC/ELEC ______
2" STM VLV (2-WAY) (OP) Act. = Type F5
EQUIPMENT CONDITION: EXCELLENT(E), GOOD(G), POOR(P) T'STAT ?
H'STAT — COMPR — DAMPERS G LINKAGES G FANS G SHEAVES G
VALVES P ACTUATORS P BELTS G MIXING BOX G
OTHER___

COMMENTS: STEAM VALVES & TRAPS LEAK THRU EVEN @ SHUT DOWN. ✓

SEE SHT M-7 FOR OPERATING STRATEGY (or Sheet 11 of 12)

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

✓ AIR HANDLING UNITS:
MANUFACTURER TRANE CLIMATE CHGR MODEL No. 17/SN L168-044398
AHU NUMBER: 3 thru 6 AHU TYPE: DRAW THRU
LOCATION: GYM CATWALK SPACE SERVED: ZONE 2

✓ FAN DATA:
SUPPLY FAN HP: 5 SUPPLY CFM: 11,300 STATIC PRESS: 0.25
RETURN FAN HP: — RETURN CFM: — STATIC PRESS: —
EXHAUST FAN HP: — EXHAUST CFM: — STATIC PRESS: —
MOTOR STARTER: MNT __ MOM __. SWITCH: P.B. __ H.O.A. ✓ DISCON __

COILS:
HEATING: HW __ STM ✓ DIRECT FIRED --> NG __ OIL __ ELC__ OTHER __
NO COOLING: CW __ DX __. FROM CHILLER ________, FROM DX UNIT ______
NO REHEAT: # OF COILS ___ TYPE _____. RECOOL: # OF COILS ___ TYPE ____
NO HUMIDITY: STM __ SPRAY __ ELC __. HW/CW COIL VALVES: 2 WAY __, 3 WAY __

✓ DAMPERS:
O.A. DAMPER: Y (Y, N), IF YES, FIXED __%, MODULATING 10% TO 100%
R.A. DAMPER: Y (Y, N), IF YES, FIXED __%, MODULATING 0% TO 100%
E.A. DAMPER: N (Y, N), IF YES, FIXED —%, MODULATING —% TO —%
ECONOMIZER: N (Y, N), IF YES, OA — RA — ENTHALPY —
OA LEAKAGE: 10 % IF NO, CAN ECONOMIZER BE ADDED ________
Face & Bypass Dampers Act. = Type F4 (UN) ; O.A. Damper Act. Type F6
FILTER CONDITION: ___GOOD ___FAIR ✓ POOR T.A.

SYSTEM OPERATION: MON - FRI SAT SUN
*PRESENT OPERATION: ______ TO ______ ______ TO ______ ______ TO ______
*REQUIRED OPERATION: ______ TO ______ ______ TO ______ ______ TO ______

	HEATING SETPOINTS				COOLING SETPOINTS			
	WEEKDAYS		WEEKENDS		WEEKDAYS		WEEKENDS	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
*PRESENT TEMP:								
*REQUIRED TMP:								

HUMIDIFICATION REQUIREMENTS (RH): ____ HUMIDISTAT LOCATION: _____

SYSTEM SETPOINTS: MIXED AIR ___°F, HOT DECK ___°F, COLD DECK ___°F
TIME CLOCK: N (Y, N), IF YES, IS IT OPERATIONAL ___ (Y, N)

CONTROLS: PNEUMATIC ______, ELECTRIC ✓, PNEUMATIC/ELEC ______
STM VLV 2-WAY 1½" Type J (UN) O.A. cutout on Stm Vlv. - closes when O.A. above 65°F
EQUIPMENT CONDITION: EXCELLENT(E), GOOD(G), POOR(P) T'STAT P
H'STAT — COMPR — DAMPERS G LINKAGES G FANS G SHEAVES G
VALVES P ACTUATORS P BELTS G MIXING BOX G
OTHER___

COMMENTS: ALL STEAM VALVES & TRAPS LEAK EVEN @ SHUT-DOWN.
SEE SHT M-7 FOR OPERATING STRATEGIES.
Summer/winter/night switch present ; (OP)

__FMEA_SURVEY_OBSERVATIONS__

MECHANICAL_EQUIPMENT_DATA

✓ AIR HANDLING UNITS:
MANUFACTURER TRANE________ MODEL No.________
AHU NUMBER: 7 AHU TYPE: CABINET AIR CONDITIONER
LOCATION: RM 102 CEILING SPACE SERVED: RM 102 (OFFICE) ZONE 1

✓ FAN DATA:
SUPPLY FAN HP: 1/12 SUPPLY CFM: 600 STATIC PRESS: —
RETURN FAN HP: — RETURN CFM: — STATIC PRESS: —
EXHAUST FAN HP: — EXHAUST CFM: — STATIC PRESS: —
MOTOR STARTER: MNT __ MOM __. SWITCH: P.B. __ H.O.A. ✓ DISCON __

✓ COILS:
HEATING: HW __ STM __ DIRECT FIRED --> NG __ OIL __ ELC ✓ OTHER __
COOLING: CW ✓ DX __. FROM CHILLER CENTRAL, FROM DX UNIT _______
NO REHEAT: # OF COILS ___ TYPE _____. RECOOL: # OF COILS ___ TYPE ____
NO HUMIDITY: STM __ SPRAY __ ELC __. HW/CW COIL VALVES: 2 WAY ✓, 3 WAY __

DAMPERS:
O.A. DAMPER: Y (Y, N), IF YES, FIXED —%, MODULATING 0% TO 100%
R.A. DAMPER: N (Y, N), IF YES, FIXED —%, MODULATING —% TO —%
E.A. DAMPER: N (Y, N), IF YES, FIXED —%, MODULATING —% TO —%
ECONOMIZER: N (Y, N), IF YES, OA — RA — ENTHALPY —
OA LEAKAGE: 5 % IF NO, CAN ECONOMIZER BE ADDED NO RA Capability

FILTER CONDITION: ___GOOD ___FAIR ___POOR NONE

SYSTEM OPERATION:

	MON - FRI		SAT		SUN	
*PRESENT OPERATION:	______ TO	______	______ TO	______	______ TO	______
*REQUIRED OPERATION:	______ TO	______	______ TO	______	______ TO	______

	HEATING SETPOINTS				COOLING SETPOINTS			
	WEEKDAYS		WEEKENDS		WEEKDAYS		WEEKENDS	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
*PRESENT TEMP:								
*REQUIRED TMP:								

HUMIDIFICATION REQUIREMENTS (RH): ____ HUMIDISTAT LOCATION: _____

SYSTEM SETPOINTS: MIXED AIR ___°F, HOT DECK ___°F, COLD DECK ___°F
TIME CLOCK: N (Y, N), IF YES, IS IT OPERATIONAL ___ (Y, N)

CONTROLS: PNEUMATIC ______, ELECTRIC ✓, PNEUMATIC/ELEC ______

EQUIPMENT CONDITION: EXCELLENT(E), GOOD(G), POOR(P) T'STAT G
H'STAT — COMPR — DAMPERS G LINKAGES — FANS G SHEAVES —
VALVES ? ACTUATORS ? BELTS — MIXING BOX G
OTHER___

COMMENTS: ____

--> Disregard if the item is the same as the GENERAL BUILDING DATA.

Bldg No.: 2357

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

HEATING PLANT

PLANT DESCRIPTION:
NUMBER OF UNITS: 1
MAKE & MODEL: 1) ____
2) ____
3) ____

EQUIPMENT: ___ BOILER ___ DIRECT FIRED ✓ STEAM CONV
TYPE: ✓ STEAM ___ HW ___ CAST IRON ___ WATER TUBE, FIRE TUBE
FUEL: NAT GAS ____ ELECTRIC ____ OIL ____ OTHER ____

MULTIPLE UNIT OPERATION SEQUENCE:
SERIES ____ PARALLEL ____

BURNER STAGES: SUPPLIED BY HTHW FROM CENTRAL PLANT

NO FIRING RATE/FUEL: #1: ____ #2: ____

NO BURNER TYPE: ___ POWER: MFR ____ MOD No. ____
BLOWER ___/__/___-___A ___HP @ ___CFM
CONTRL ___/__/___-___A
___ ATMOS: MFR ____ MOD No. ____

___ HOT WATER: SUPPLY SIZE ____ TEMPERATURE ____ PRESSURE ___PSI
RETURN SIZE ____ TEMPERATURE ____ PRESSURE ~~0~~ PSI
✓ STEAM: HEADER SIZE 3" TEMPERATURE ____ PRESSURE ~~5~~ 15 PSI

RATED CAPACITY: MAX BTUH IN ____
MAX BTUH OUT 2582,250

CONTROLS: TYPE ELECTRIC, BARBER COLMAN
CONDITION GOOD

PLANT AUXILIARIES:
PUMPS: ~~HW~~ 1) ___/__/___-___A ____HP
~~CW 2) 200 / 3 / 60 - 3.96 A 3/4~~ HP
COND 1) 208 / 3 / 60 - ~~3.96~~ A 2.0 ~~3/4~~ 1/2 HP
2) 208 / 3 / 60 - ~~3.96~~ A 2.0 ~~3/4~~ 1/2 HP

FANS: 1) ___/__/___-___A ____HP @ ____CFM
2) ___/__/___-___A ____HP @ ____CFM
3) ___/__/___-___A ____HP @ ____CFM

OTHER 1) 208 / 3 / 60 - 3.96 A 3/4 HP (CHW)
2) ___/__/___-___A ____HP

AUX OPERATING SCHEDULES:
PUMPS: HW 1) ON ____ OFF ____ 2) ON ____ OFF ____
COND 1) ON 1 MIN OFF 25 MIN 2) ON 1 MIN OFF 25 (ALTERNATE)
FANS: 1) ON ____ OFF ____ 2) ON ____ OFF ____ 3) ON ____ OFF ____
OTHER: 1) ON 00 OFF 24 2) ON ____ OFF ____ (SUMMER ONLY)

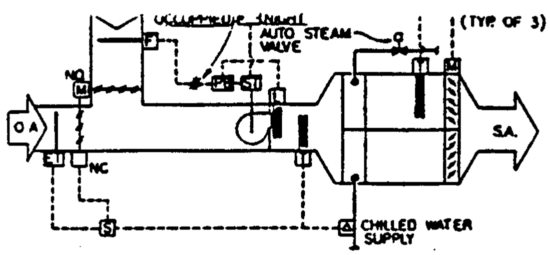
AUXILIARY FUEL USED: #2 OIL ____ NAT GAS ____ OTHER ____

Bldg No.: 2357

MECHANICAL EQUIPMENT DATA

EXHAUST FANS:

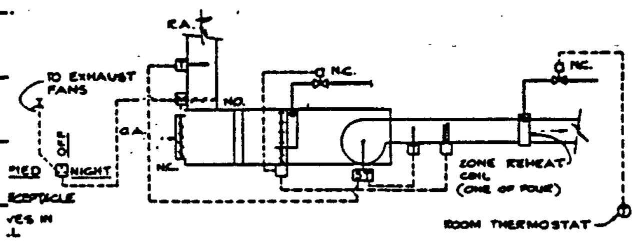
UNIT NO.	TYPE		SP	CFM	HP	STARTER & CONTROL	SETPOINT
EE-1	VENT		0.5	560	1/12	DISCONNECT	—
EE-2	VENT		0.6	4650	~2	DISC.	—
EE-3	PROP		0.2	22,600	2 1/2	HOA	SEE M-7
EE-4	PROP		0.2	22,600	2	HOA	"
EE-5	PROP		0.1	5580	~1/2	DISC	—



AIR HANDLING UNIT #1

MULTIZONE UNIT SEQUENCE OF CONTROL

1. AHU FAN IS STARTED MANUALLY FROM THE MODE SELECTOR SWITCH AND RUNS CONTINUOUSLY PROVIDED FIRESWITCH SENSES RETURN AIR LESS THAN 136° F AND FREEZESTAT SENSES FAN DISCHARGE TEMPERATURE ABOVE 38°F.
2. OUTSIDE AIR DAMPER CLOSES WHEN AHU FAN IS DE-ENERGIZED.
3. WHEN AQUASTAT IN SUPPLY LINE TO CHILLED WATER COIL SENSES PRESENCE OF CHILLED WATER, OR WHEN ECONOMIZER THERMOSTAT SENSES OUTSIDE AIR TEMPERATURE ABOVE 70° F, OUTSIDE AIR DAMPER GOES TO MINIMUM POSITION.
4. WHEN CHILLED WATER IS NOT PRESENT IN SUPPLY LINE, OR OUTSIDE AIR IS BELOW 70° F, OUTSIDE RETURN AND RETURN AIR DAMPERS ARE MODULATED BY A THERMOSTAT IN THE FAN DISCHARGE TO MAINTAIN 55° F SETPOINT.
5. A TEMPERATURE SENSOR IN THE HOT DUCT AND AN OUTSIDE AIR TEMPERATURE SENSOR MODULATE STEAM VALVE THROUGH A RESET CONTROLLER. HOT DECK TEMPERATURE IS RESET INVERSELY WITH OUTSIDE AIR TEMPERATURE.
6. A ROOM THERMOSTAT IN EACH ZONE MODULATES ZONE MIXING DAMPERS TO MAINTAIN SPACE TEMPERATURE.
7. WHEN THE BUILDING SELECTOR SWITCH IS IN THE "NIGHT" POSITION THE OUTDOOR AIR DAMPER SHALL BE FULL CLOSED AND THE RETURN AIR DAMPER FULL OPENED.

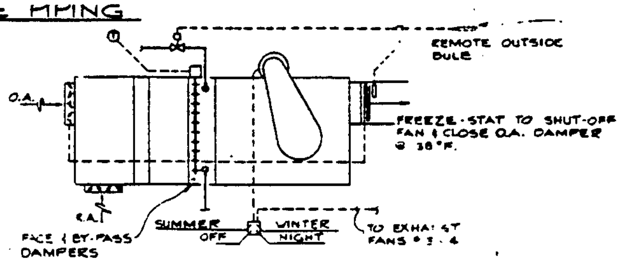


SE CONNECTION
ECESS BUILT INTO ALL
STANDPIPE
OF RECESS BELOW /EL OF WASHER
SH-IN DETAIL

1. UNIT IS STARTED MANUALLY FROM SWITCH IN "OFFICE" AND RUNS CONTINUOUSLY PROVIDED FIRESWITCH SENSES RETURN AIR LESS THAN 136° F AND FREEZESTAT SENSES FAN DISCHARGE TEMPERATURE ABOVE 38° F (35°-38°).
2. OUTSIDE AIR DAMPER CLOSES WHEN FAN MOTOR IS STOPPED.
3. UNIT SHALL BE INTERLOCKED TO START EXHAUST FANS WHEN SYSTEM SWITCH IS IN "OCCUPIED" POSITION.
4. RETURN AIR DAMPERS SHALL BE IN FULL OPEN POSITION WHEN SYSTEM SWITCH IS IN "NIGHT" POSITION.
5. DOWNSTREAM THERMOSTAT SHALL MODULATE PRE-HEAT COIL FACE AND BYPASS DAMPERS TO MAINTAIN 50° (45°-70°). STEAM VALVE SHALL OPEN WITH FACE DAMPER.
6. ROOM THERMOSTAT SHALL MODULATE STEAM VALVE TO MAINTAIN SETPOINT (68°-40°).

AIR HANDLING UNIT #2

PIPING

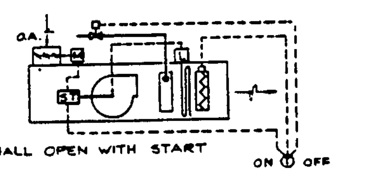


SUMMER CYCLE: OUTDOOR AIR DAMPER FULL OPEN, RETURN DAMPER CLOSED. EXHAUST FANS # 3 & 4 ON HIGH SPEED.

WINTER CYCLE: FRESH AIR DAMPER OPEN TO MINIMUM POSITION, RETURN AIR DAMPER OPEN TO WINTER POSITION, COIL VALVE OPENS BELOW 67°F, FACE & BY-PASS DAMPERS MODULATING, EXHAUST FAN # 3 ON LOW SPEED. EXHAUST FAN # 4 IS OFF.

NIGHT CYCLE: OUTDOOR AIR DAMPER CLOSED, RETURN AIR DAMPER FULLY OPENED, EXHAUST FAN OFF.

AIR HANDLING UNITS # 3,4,5 & 6



1. OUTDOOR AIR SHALL OPEN WITH START OF UNIT.
2. CHILLED WATER CONTROL VALVE OR ELECTRIC HEATING COIL SOLENOID SHALL OPERATE TO MAINTAIN ROOMSTAT SET POINT.
3. IF FREEZE-STAT SENSES DISCHARGE TEMERATURE BELOW 38°F, OUTSIDE AIR DAMPER SHALL CLOSE AND FAN STOPS.

AHU #7- SEQUENCE OF CONTROL (CABINET AIR CONDITIONER)

NOTES: TYPE --> propeller, ... fugal, etc.
STARTER & CONTROL --> momentary, maintained, line v stat, 24 v stat, self contained, etc.

Bldg No.: 2357

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

UNITARY HEATING EQUIPMENT:

UNIT NO.	TYPE	OUTPUT CAPACITY	HEATING SOURCE	CFM	HP	STARTER & CONTROL	SETPOINT
UH #1	UNIT	19,400	5 PSI STM	300	1/12	T-STAT	58°F

FILM #: _______ FRAME #: _______

NOTES: TYPE --> unit heater, unit ventilator, duct furnace, wall furnace, etc.
HEATING SOURCE --> electric, gas fired, oil, steam, hot water, etc.
STARTER & CONTROL --> momentary, maintained, line v stat, 24 v stat, self contained, etc.

Bldg No.: 2351

**** FMEA SIMILAR BUILDINGS SURVEY FORM ****

9/92
AJN/JOE

NERAL BUILDING DATA

BLDG #: 1856(P) BLDG NAME: GYM DATE: ~~2-13-85~~ JOB #: 124
SURVEYED BY: AM BLDG CONTACT: TELEPHONE EXT:
BLDG USE: GYM # FLOORS: 1.2 # PEOPLE: 10 BLDG AREA: 23159 SF

BLDG OCCUPANCY: S $\boxed{M\ T\ W\ Th\ F}$ S 0700 TO 2000 SUMMER
S $\boxed{M\ T\ W\ Th\ F}$ S 0630 TO 2200 WINTER
SAT + SUN 1000 1800

T'STAT SETTING: HTG: 75 / — AUTO SETBACK: N / Y: ___ / ___
CLG: 75 / —
Temperature,Future,inside,Occupied: 65/78 Temp Present: 72
Temperature,Future,inside,Unoccupied: 55/- AirChange/hR: .39

ARCHITECTURAL

	AREA	U-value	UA
WALL	17,535	.161	2,823
GLASS	500	1.176	588
ROOF	21126	.119	2514
FLOOR	610	.86	525
SUM	39,771	—	6,450

Avg. Floor-Ceiling Height: 20' Floor type: SLAB Insulated: Y/N
"indow frame type: Alum Wood Operable sections: Y / N
ndow size: ___ x ___ SP DP CURT Infiltration L M H
Entry doors: 8 # OH Doors: 0 % of Area Conditioned: 100

LIGHTING: Type: Fluorescent/MV Watts/SF: 1.3 Util Frac: ___

ELECTRICAL EQUIP: KW/Unit: ___ #Units: ___ Util Frac: ___

DHW: TYPE: NG/ELEC/CONV Supply Temp: ~150 GAL/Person-Day: ___
AFUE: 63.1 %

MECHANICAL

		HEATING	COOLING
	Primary System:	HTHW → STM Conv.	CHW
	Fuel:	NaG (CP)	NaG (CP)
	Capacity:	258225 KBTUH	
	est.Peak Del.Effic:	103.1%	51.12%
	Months ON:	8	4
	Hours ON:	5808	2952
AHUs	Hp:	32.5	5
	cfm:	67,575	8140
	Min OA:	20%	20%
	Economizer:	→	Dumb

MISC:
- 1-4 ZONE AHU, 5-SINGLE ZONE UNITS
- 1-CONVERTOR - 212 MBH OUT
- 1-STEAM GENERATOR - 2120 MBH OUT

JOB FT CARSON EEAP UPDATE

SHEET NO. ______ OF ______

E M C ENGINEERS, INC.

Denver • Colorado Springs • Atlanta • Germany

CALCULATED BY AJN DATE 9/92

CHECKED BY ______ DATE ______

SCALE ______

P-1856

AHU 1 (serves weight Rm & Squash Courts) Htg Only 7.5 HP

T-STATS operate F & Bypass dampers.

O.A. Act. Type B ; STM 2-WAY VLV. 1 1/4" Act. = Type J

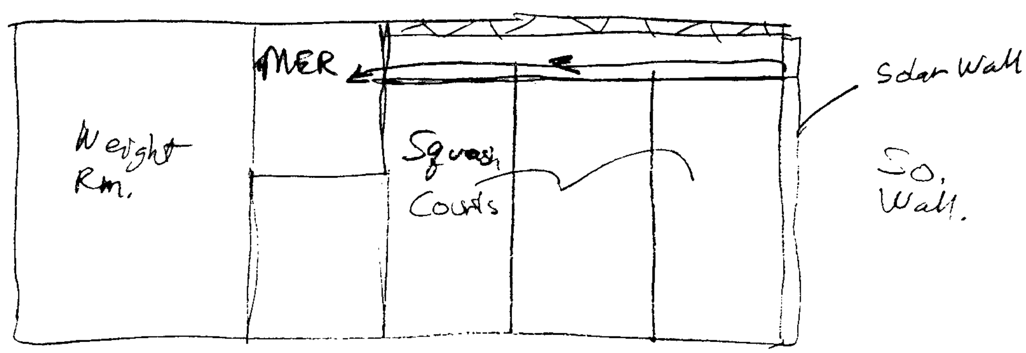
R.A. Act. Type B → opens & closes on O.A. sensor setpt. of 66°F

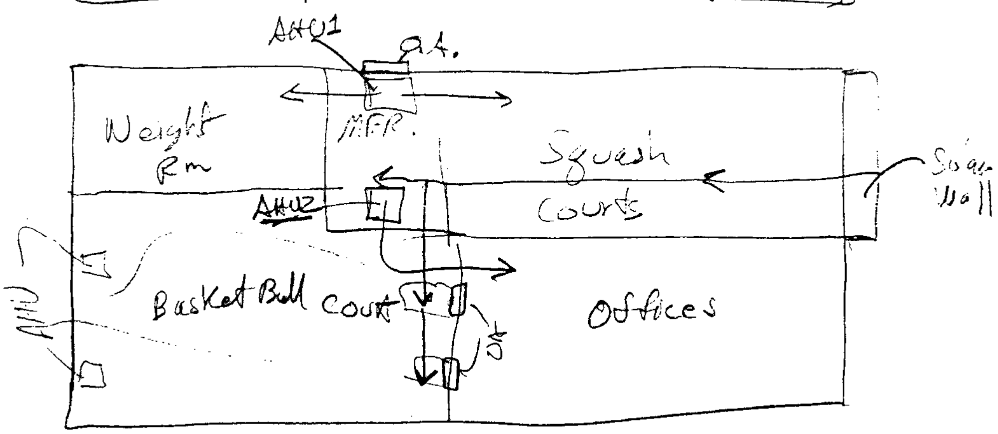
AHU 2 (Hallways / Offices / Rest Rms) Same

TSTATS operate F & Bypass dampers.

O.A. Act. = MA-415 (B/C)

STM 2-WAY same ; Set at 53°





*** FMEA SURVEY OBSERVATIONS ***

9/92 AJN

GENERAL BUILDING DATA - 2-ZONES

BLDG #: 2359 BLDG NAME: IVY CHAPEL JOB #: 174

SURVEYED BY: TEAM 1 DATE: ~~12/18/84~~ BLDG CONTACT: CHPLN JOHNSON

CONTACT TELEPHONE NUMBER: 579-3356/5628 BLDG USAGE: RELIGIOUS SERVICES

TOT BLDG AREA: 8542 SF # OF FLOORS: 1 # OF PEOPLE: ________

BUILDING OCCUPANCY: ✓

	MON - FRI:	0730 TO 1730	~~FIRST SHIFT~~	8
	SATURDAY:	1630 TO 1900	~~SECND SHIFT~~	65
	SUNDAY:	~~0800~~ TO ~~1600~~	~~THIRD SHIFT~~	~~145~~
TUES & FRI	~~HOLIDAYS~~	1900 TO 2200	~~HOLIDAYS~~	80

SUNDAYS: 1000 TO 1300 ~ 100 people

ENVIRONMENTAL CONDITIONS:

ZONE 1/ZONE 2	HEATING SETPOINTS WEEKDAYS DAY	WEEKDAYS NIGHT	WEEKENDS DAY	WEEKENDS NIGHT	COOLING SETPOINTS WEEKDAYS DAY	WEEKDAYS NIGHT	WEEKENDS DAY	WEEKENDS NIGHT
PRESENT T'STAT:	70/60	70/60			ES. 75/75°	—		
REQUIRED T'STAT:					78/78	—		

THERMOSTAT LOCATION(S): ________

HUMIDIFICATION REQUIREMENTS (RH): ____ H'STAT LOCATION(S): ________

LIGHTING: ✓

ZN	AREA(SF)	LAMP TYPE	#LMPS	W/SF	SCHEDULE
1)	3460	FL/IN.		2.28	ON______ OFF______
2)	5217	FL/IN		1.42	ON______ OFF______
3)					ON______ OFF______
4)					ON______ OFF______

DATA SOURCE: ___OBSERVATION ___ASHRAE ___OTHER

SEE ATTACHED SCHEDULE? ___Y ___N

ELECTRIC EQUIPMENT:

	AREA(SF)	TYPE	(KW)	W/SF	SCHEDULE
1)					ON______ OFF______
2)					ON______ OFF______
3)					ON______ OFF______
4)					ON______ OFF______

DATA SOURCE: ___OBSERVATION ___ASHRAE ___OTHER

SEE ATTACHED SCHEDULE? ___Y ___N

INTERNAL MASS: MATERIAL: BOOKS, FURNITURE ESTIMATED MASS: L (L, M, H)

INFILTRATION: LOCATION(S): THE BUILDING IS SLIGHTLY PRESSURIZED, THEREFORE, NO INFILTRATION OCCURS

ESTIMATED RATE: _____(L, M, H) or
_____AIR CHANGES or
_____CFM/LIN FT CRACK

*** FMEA SURVEY OBSERVATIONS ***

GENERAL BUILDING DATA:

CONSTRUCTION: ✓

WALLS:

	CONSTRUCTION COMPONENT	WIDTH	HEIGHT	AREA (SF)	U-VALUE
NE ~~N~~:	BRICK/CMU			773	0.129
SE ~~S~~:	BRICK/CMU			587.7	0.129
SW ~~E~~:	BRICK/CMU			728.5	0.129
NW ~~W~~:	BRICK/CMU			1298.8	0.129

ROOFS: ✓

CONSTRUCTION COMPONENT	WIDTH	HEIGHT	AREA (SF)	U-VALUE
BUR/INS/MTL DECK			4035.4	.109

WINDOWS: ✓

	AREA (SF)	~~TYPE~~ U-FACTOR	SF	DF	DRAPES
NE ~~N~~:	261.4	0.68		X	
SE ~~S~~:	192.0	0.568	X	X	
SW ~~E~~:	253.3	0.847		X	
NW ~~W~~:	132.0	0.568	X	X	

FLOOR TYPE: X SLAB ___ CRAWL SPACE ___ BASEMENT ___ OTHER*
AREA: 3460 SF

PERIMETER: 203.0 LF INSULATION? ✓ Y ___ N 2 IN to 24" Deep

SPECIAL AREAS: ______

ADDITIONAL NOTES: ______

FILM #: ________ FRAME #: ________

SKETCHES:

* Specify in "Additional Notes"

Bldg No.: 2359 - ZONE 1

__FMEA_SURVEY_OBSERVATIONS__

GENERAL_BUILDING_DATA

CONSTRUCTION: ✓

WALLS:

	CONSTRUCTION COMPONENT	WIDTH	HEIGHT	AREA(SF)	U-VALUE
NE ~~N~~:	BRICK/CMU			796.0	0.129
SE ~~S~~:				1713.4	0.129
SW ~~E~~:				884.0	0.129
NW ~~W~~:				1127.6	0.129

ROOFS:

CONSTRUCTION COMPONENT	WIDTH	HEIGHT	AREA(SF)	U-VALUE
MIL/INS/CONC/BUR			5122.6	0.090

WINDOWS:

	AREA(SF)	TYPE *	SF	DF	DRAPES
NE ~~N~~:	88.0			X	
SE ~~S~~:	—		—	—	
SW ~~E~~:	—		—	—	
NW ~~W~~:	—		—	—	

FLOOR TYPE: X SLAB ___ CRAWL SPACE ___ BASEMENT ___ OTHER*
AREA: 5217 SF

PERIMETER: 217 LF INSULATION? X Y ___ N 2" IN to 24" DEEP

SPECIAL AREAS: ____________________

ADDITIONAL NOTES: * SKYLIGHT - 630 SF / 0.568 U

FILM #: ________ FRAME #: ________

SKETCHES:

* Specify in "Additional Notes"

Bldg No.: 2359 - ZONE 2

*** FMEA SURVEY OBSERVATIONS ***

GENERAL BUILDING DATA

MISCELLANEOUS BASE LOADS:
DOMESTIC HOT WATER:
MANUFACTURER & MODEL RHEEM/4500 W/30 GAL
FUEL SOURCE ___ NAT GAS X ELEC ___ OIL ___ STM GEN ___ OTHER*
SUPPLY TEMPERATURE 152 °F, DISTANCE FROM HEATER 10 FT
INPUT 4500W RECOVERY RATE _______ OPERATING SCHEDULE ___________

EXTERIOR LIGHTING:
TYPE INC NO 7 SCHEDULE ___________ CONTROL PHOTO
TYPE ___________ NO ___ SCHEDULE ___________ CONTROL ___________
TOTAL KW .07
FUNCTION OF LIGHTS ___ SECURITY ___ PARKING LOT X ENTRY
___ OTHER*

ADDITIONAL COMMENTS: ___________

FILM #: ______ FRAME #: ___________

ADDITIONAL SKETCHES:

* Specify in "Additional Comments"

Bldg No.: 2359

*** FMEA SURVEY OBSERVATIONS ***

GENERAL BUILDING DATA

LIGHTING SCHEDULE

Page ___of___

AREA: (A)MAIN____________SF (B)MEZZ____________SF
(A) ________X________ (B) ________X________

DATA SOURCE: ___DRAWINGS ___SURVEY TOUR

Mark	#lamps	W/Fix	#Fix	Flr #	Comments	
F	2	100	2	A	CHOIR/STORAGE	ZONE 1
F	2	100	2	A	CHAPEL	ZONE 1
I	1	150	15	A	HALLWAY	ZONE 1
F	2	100	2	A	NURSERY (RM 118)	ZONE 1
I	1	200	1	A	"	"
F	2	100	2	A	TOILET	ZONE 1
I	1	150	18	A	NARTHEX (LOBBY)	ZONE 1
F	2	100	1	A	UTILITY	ZONE 1
F	2	100	2	A	MEN'S TOILET	ZONE 1
F	2	100	2	A	WMN'S TOILET	ZONE 1
F	2	100	4	A	RM 113	ZONE 1
F	2	100	6	A	RM 114, 116, 117	ZONE 1
I	1	150	3	A	RM 114, 116, 117	ZONE 1
	83					

(A)TOTAL: 7900.0 Watts/ 3460 SF= 2.28 W/SF

(B)TOTAL: ________Watts/________SF=______ W/SF

ADDITIONAL NOTES:

*** FMEA SURVEY OBSERVATIONS ***

GENERAL BUILDING DATA

LIGHTING SCHEDULE

Page ___of___

AREA: (A)MAIN____________SF (B)MEZZ____________SF
(A) ________X________ (B) ________X________

DATA SOURCE: ___DRAWINGS _✓_SURVEY TOUR

Mark	#lamps	W/Fix	#Fix	Flr #	Comments
F	2	100	3	A	KITCHEN/PANTRY - ZONE 2
F	2	100	4	A	REC ROOM-REC. - ZONE 2
F	2	100	1	A	STORAGE-REC. - ZONE 2
I	1	60	12	A	REC ROOM-REC. - ZONE 2
F	1	50	15	A	SANCTUARY - ZONE 2
I	1	500	5	A	" "
I	1	300	5	A	" "
I	1	100	6	A	" "
I	1	60	4	A	" "
I	1	150	2	A	" "
	65				

(A)TOTAL: ___7410.0___Watts/______5217____SF=__1.42__ W/SF

(B)TOTAL: ______________Watts/________________SF=________ W/SF

ADDITIONAL NOTES:

Bldg No.: 2359 ZONE 2

__FMEA_SURVEY_OBSERVATIONS__

MECHANICAL_EQUIPMENT_DATA

AIR HANDLING UNITS:
MANUFACTURER TRANE MODEL No. CLIMATE CHGR
AHU NUMBER: 2 AHU TYPE: VERTICAL DRAW-THRU
LOCATION: MER SPACE SERVED: ZONE L

FAN DATA:
SUPPLY FAN HP: 3 SUPPLY CFM: 3445 STATIC PRESS: 1 3/4
RETURN FAN HP: — RETURN CFM: — STATIC PRESS: —
EXHAUST FAN HP: — EXHAUST CFM: — STATIC PRESS: —
MOTOR STARTER: MNT __ MOM __. SWITCH: P.B. __ H.O.A. ✓ DISCON __

COILS:
HEATING: HW ✓ STM __ DIRECT FIRED --> NG __ OIL __ ELC__ OTHER __
COOLING: CW ✓ DX __. FROM CHILLER CENTRAL FROM DX UNIT _______
NO REHEAT: # OF COILS ___ TYPE _____. RECOOL: # OF COILS ___ TYPE ____
NO HUMIDITY: STM __ SPRAY __ ELC __. HW/CW COIL VALVES: 2 WAY __, 3 WAY __

DAMPERS:
O.A. DAMPER: __ (Y, N), IF YES, FIXED __%, MODULATING 25% TO 100%
R.A. DAMPER: __ (Y, N), IF YES, FIXED __%, MODULATING Ø% TO 100%
E.A. DAMPER: __ (Y, N), IF YES, FIXED __%, MODULATING Ø% TO 50%
ECONOMIZER: __ (Y, N), IF YES, OA __ RA __ ENTHALPY __
OA LEAKAGE: 15 % IF NO, CAN ECONOMIZER BE ADDED Y/N unless addtl. duct work & dampers are installed.

FILTER CONDITION: ___GOOD ✓ FAIR ___POOR TA

SYSTEM OPERATION: MON - FRI SAT SUN
*PRESENT OPERATION: CONT TO _____ _____ TO _____ _____ TO _____
*REQUIRED OPERATION: _____ TO _____ _____ TO _____ _____ TO _____

	HEATING SETPOINTS				COOLING SETPOINTS			
	WEEKDAYS		WEEKENDS		WEEKDAYS		WEEKENDS	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
*PRESENT TEMP:								
*REQUIRED TMP:								

HUMIDIFICATION REQUIREMENTS (RH): ____ HUMIDISTAT LOCATION: _____

SYSTEM SETPOINTS: MIXED AIR ___°F, HOT DECK ___°F, COLD DECK ___°F
TIME CLOCK: ___ (Y, N), IF YES, IS IT OPERATIONAL ___ (Y, N)

CONTROLS: PNEUMATIC ______, ELECTRIC ✓, PNEUMATIC/ELEC ______

EQUIPMENT CONDITION: EXCELLENT(E), GOOD(G), POOR(P) T'STAT G
H'STAT — COMPR — DAMPERS P LINKAGES P FANS G SHEAVES G
VALVES P ACTUATORS G BELTS G MIXING BOX G
OTHER___

COMMENTS: Barber Colman Elect. Controls; Act. Type J on MTHW To Coil (3-Way 1" Valve)
O.A. Damper Is Type G - minimum O.A. only.

Bldg No.: 2359 ZONE L

*****__FMEA_SURVEY_OBSERVATIONS__*****

MECHANICAL_EQUIPMENT_DATA

✓ AIR HANDLING UNITS:
MANUFACTURER TRANE MODEL No. CLIMATE CHGR
AHU NUMBER: 1 AHU TYPE: VERTICAL DRAW-THRU
LOCATION: MER SPACE SERVED: SANCTUARY (NAVE)

✓ FAN DATA:
SUPPLY FAN HP: 3 SUPPLY CFM: 6255 STATIC PRESS: 2"
RETURN FAN HP: 1 RETURN CFM: 4730 STATIC PRESS: 3/8"
EXHAUST FAN HP: — EXHAUST CFM: — STATIC PRESS: —
MOTOR STARTER: MNT __ MOM __. SWITCH: P.B. __ H.O.A. ✓ DISCON __

COILS:
HEATING: HW ✓ STM __ DIRECT FIRED --> NG __ OIL __ ELC__ OTHER __
COOLING: CW ✓ DX __. FROM CHILLER CENTRAL, FROM DX UNIT _______
NO REHEAT: # OF COILS ___ TYPE _____. RECOOL: # OF COILS ___ TYPE ____
NO HUMIDITY: STM __ SPRAY __ ELC __. HW/CW COIL VALVES: 2 WAY __, 3 WAY __

DAMPERS:
O.A. DAMPER: __ (Y, N), IF YES, FIXED __%, MODULATING 25% TO 100%
R.A. DAMPER: __ (Y, N), IF YES, FIXED __%, MODULATING 0% TO 100%
E.A. DAMPER: __ (Y, N), IF YES, FIXED __%, MODULATING 0% TO 50%
ECONOMIZER: __ (Y, N), IF YES, OA ✓ RA __ ENTHALPY __
OA LEAKAGE: 15 % IF NO, CAN ECONOMIZER BE ADDED Ø ✓

FILTER CONDITION: ___GOOD ✓ FAIR ___POOR TA

SYSTEM OPERATION:

	MON - FRI		SAT		SUN	
*PRESENT OPERATION:	______ TO	______	______ TO	______	______ TO	______
*REQUIRED OPERATION:	______ TO	______	______ TO	______	______ TO	______

	HEATING SETPOINTS WEEKDAYS		HEATING SETPOINTS WEEKENDS		COOLING SETPOINTS WEEKDAYS		COOLING SETPOINTS WEEKENDS	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
*PRESENT TEMP:	60	60	70	60				
*REQUIRED TMP:	60	60	70	60				

NO HUMIDIFICATION REQUIREMENTS (RH): ____ HUMIDISTAT LOCATION: _____

SYSTEM SETPOINTS: MIXED AIR ___°F, HOT DECK ___°F, COLD DECK ___°F
TIME CLOCK: ___ (Y, N), IF YES, IS IT OPERATIONAL ___ (Y, N)

CONTROLS: PNEUMATIC ______, ELECTRIC ✓, PNEUMATIC/ELEC ______

EQUIPMENT CONDITION: EXCELLENT(E), GOOD(G), POOR(P) T'STAT G
H'STAT — COMPR — DAMPERS P LINKAGES P FANS G SHEAVES G
VALVES P ACTUATORS G BELTS G MIXING BOX G
OTHER___

COMMENTS: UNIT WAS NOT OPERATING @ TIME OF SURVEY — ALL ATTEMPTS TO RUN UNIT FOR TEST PURPOSES WERE UNSUCCESSFUL — 1" 3 way Coil Valve Act. Type B

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

AIR HANDLING UNITS:
MANUFACTURER TRANE MODEL No. CLIMATE CHGR
AHU NUMBER: 3 AHU TYPE: HORIZONTAL DRAWTHRU
LOCATION: OVER KITCHEN CLG SPACE SERVED: ZONE 2

FAN DATA:
SUPPLY FAN HP: ~2 SUPPLY CFM: 2320 STATIC PRESS: 1.5
RETURN FAN HP: — RETURN CFM: — STATIC PRESS: —
EXHAUST FAN HP: — EXHAUST CFM: — STATIC PRESS: —
MOTOR STARTER: MNT __ MOM __. SWITCH: P.B. __ H.O.A. ✓ DISCON __

COILS:
HEATING: HW ✓ STM __ DIRECT FIRED --> NG __ OIL __ ELC__ OTHER __
COOLING: CW ✓ DX __. FROM CHILLER CENTRAL FROM DX UNIT ______
NO REHEAT: # OF COILS ___ TYPE _____. RECOOL: # OF COILS ___ TYPE ____
NO HUMIDITY: STM __ SPRAY __ ELC __. HW/CW COIL VALVES: 2 WAY __, 3 WAY __

DAMPERS:
O.A. DAMPER: __ (Y, N), IF YES, FIXED __%, MODULATING 25% TO 100%
R.A. DAMPER: __ (Y, N), IF YES, FIXED __%, MODULATING 0% TO 100%
E.A. DAMPER: __ (Y, N), IF YES, FIXED __%, MODULATING __% TO __%
ECONOMIZER: __ (Y, N), IF YES, OA __ RA __ ENTHALPY __
OA LEAKAGE: 15____% IF NO, CAN ECONOMIZER BE ADDED Y______

FILTER CONDITION: ___GOOD ___FAIR ___POOR ? TA

SYSTEM OPERATION:

	MON - FRI		SAT		SUN	
*PRESENT OPERATION:	______ TO	______	______ TO	______	______ TO	______
*REQUIRED OPERATION:	______ TO	______	______ TO	______	______ TO	______

	HEATING SETPOINTS WEEKDAYS DAY	NIGHT	WEEKENDS DAY	NIGHT	COOLING SETPOINTS WEEKDAYS DAY	NIGHT	WEEKENDS DAY	NIGHT
*PRESENT TEMP:								
*REQUIRED TMP:								

HUMIDIFICATION REQUIREMENTS (RH): ____ HUMIDISTAT LOCATION: _____

SYSTEM SETPOINTS: MIXED AIR ___°F, HOT DECK ___°F, COLD DECK ___°F
TIME CLOCK: ___ (Y, N), IF YES, IS IT OPERATIONAL ___ (Y, N)

CONTROLS: PNEUMATIC ______, ELECTRIC ✓, PNEUMATIC/ELEC ______

EQUIPMENT CONDITION: EXCELLENT(E), GOOD(G), POOR(P) T'STAT G
H'STAT — COMPR — DAMPERS ___ LINKAGES ___ FANS ___ SHEAVES ___
VALVES ___ ACTUATORS ___ BELTS ___ MIXING BOX ___
OTHER___

COMMENTS: UNIT INACCESSIBLE DUE TO LACK OF PROPER EQUIPMENT AND QUANTITY OF GOODS IN PANTRY — MOTOR HP IS CALC'D —
3-way 1" coil Valve — Type J actuator

Bldg No.: 2359 ZONE 2

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

HEATING PLANT

PLANT DESCRIPTION:
NUMBER OF UNITS: ____
MAKE & MODEL: 1) SHELL & TUBE HX ; 1/2" 2-way Control VLV w/ Type A actuator.
2) Change Over Valve is 3" 3-way VLV w/ Type C actuator.
3) ____

EQUIPMENT: ___ BOILER ___ DIRECT FIRED ___ STEAM CONV
TYPE: ___STEAM MT HW ___CAST IRON ___WATER TUBE, FIRE TUBE
FUEL: NAT GAS _____ ELECTRIC _____ OIL _____ OTHER HTHW/CENTRAL

MULTIPLE UNIT OPERATION SEQUENCE:
SERIES — PARALLEL —

BURNER STAGES: —

FIRING RATE/FUEL: #1: — #2: —

BURNER TYPE: — POWER: MFR ____ MOD No. ____
BLOWER ____/__/___-____A _____HP @_______CFM
CONTRL ____/__/___-____A
— ATMOS: MFR ____ MOD No. ____

MT HOT WATER: SUPPLY SIZE 2 TEMPERATURE 200 PRESSURE 60 PSI
RETURN SIZE 2 TEMPERATURE 180 PRESSURE 60 PSI
___STEAM: HEADER SIZE ____ TEMPERATURE ____ PRESSURE ____PSI

RATED CAPACITY: MAX BTUH IN ____
MAX BTUH OUT 380 KBTU/hr.

CONTROLS: TYPE B-C PNEUMATIC ELECTRIC
CONDITION ____

PLANT AUXILIARIES:
PUMPS: HW 1) 208/3/60-____A 3/4 HP
2) ____/__/____-____A ____HP
COND 1) ____/__/____-____A ____HP
2) ____/__/____-____A ____HP

FANS: 1) ____/__/____-____A ____HP @____CFM
2) ____/__/____-____A ____HP @____CFM
3) ____/__/____-____A ____HP @____CFM

OTHER 1) 208/3/60-____A 1/2 HP AIR COMP
2) ____/__/____-____A ____HP

AUX OPERATING SCHEDULES:
PUMPS: HW 1) ON_____OFF_____ 2) ON_____OFF_____
COND 1) ON_____OFF_____ 2) ON_____OFF_____
FANS: 1) ON_____OFF_____ 2) ON_____OFF_____ 3) ON_____OFF_____
OTHER: 1) ON_____OFF_____ 2) ON_____OFF_____

AUXILIARY FUEL USED: #2 OIL _____ NAT GAS _____ OTHER _____

Bldg No.: 2359

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

UNITARY HEATING EQUIPMENT:

UNIT NO.	TYPE	OUTPUT CAPACITY	HEATING SOURCE	CFM	HP	STARTER & CONTROL	SETPOINT
UH1	FC	4480 BTUH	MTHW	—	~1/6	SLT-STAT	
~~FC1~~	~~FC~~	~~16MBH~~	~~MTHW~~	~~200~~	~~~1/6~~	~~WALL STAT~~	NOT USED
FC2	FC	23MBH	MTHW	300	~1/6	WALL STAT	70° (3 UNITS)
FC3	FC	30MBH	"	400	"	"	" (1 UNIT)
FC4	FC	44MBH	"	600	"	SLT-STAT	70° (3 UNITS)
FC5	FC	24MBH	"	300	"	WALL STAT	70° (1 UNIT)
FC6	FC	64MBH	"	800	~1/4	"	" "

FILM #: _______ FRAME #: _______

NOTES: TYPE --> unit heater, unit ventilator, duct furnace, wall furnace, etc.
HEATING SOURCE --> electric, gas fired, oil, steam, hot water, etc.
STARTER & CONTROL --> momentary, maintained, line v stat, 24 v stat, self contained, etc.

Bldg No.: 2359 ZONE 1

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

UNITARY COOLING EQUIPMENT:

UNIT NO.	TYPE	CAPACITY	COOLING SOURCE	CFM	HP	STARTER & CONTROL	SETPOINT
FC-1	NOT USED						
FC-2	FC	6400 BTUH	CHW	300	~1/6	WALL STAT	78° (3 UNITS)
FC-3	"	8100 BTUH	"	400	"	"	" (1 ")
FC-4	"	11,700 BTUH	"	600	"	SG. T-STAT	" (3 ")
FC-5	"	6200 BTUH	"	300	"	WALL STAT	" (1 ")
FC-6	"	16,000 BTUH	"	800	~1/4	"	"

TEMPERATURE CONTROLS

SEQUENCE OF OPERATION

1. HEATING-COOLING SYSTEM CHANGEOVER CONTROL SEQUENCE:
A remote bulb thermostat sensing outside air temperature shall switch the system to heating cycle at 70F and below, and to cooling cycle at 75F and above, by changing over three-way valve to converter on heating and chilled water on cooling and closing straight-thru chilled water valve on heating cycle.

2. CHILLED WATER SUPPLY AND RETURN TEMPERATURE AND PRESSURE SEQUENCE OF CONTROL:
A sensor in return line from heating and cooling unit shall modulate two-way valve from wide open at 58F to closed at 42F. A pressure differential controller sensing chilled water supply and chilled water return pressures shall override the temperature controller to maintain differential pressure set point. Valve shall close when system is on heating cycle.

3. HEAT EXCHANGER CONTROL SEQUENCE:
In response to an outdoor thermostat a water temperature controller shall vary the leaving water temperature by modulating the high temperature water control valve. Valve shall close when system is on cooling cycle.

4. A.H.U. #1 CONTROL SEQUENCE:
Winter Cycle: The unit fan and R.A. fan shall run continuously. Outdoor air damper D-1 and exhaust air damper D-3 shall initially open to a minimum position as determined by switch S-1. Return air damper D-2 shall close a proportionate amount. Room thermostat T-1 shall reset the control point of submaster thermostat T-2. T-2 shall on a rise in temperature first modulate 3-way valve V-1 toward by-pass position. On a continued rise in temperature T-2 shall modulate D-1 and D-3 open and D-2 closed. On a fall in temperature the reverse shall occur.
Summer Cycle: Relay R-1 shall place V-1 under direct control of T-1. Relay R-2 shall prevent D-1 and D-3 from opening beyond its minimum open position. T-1 shall on a rise in space temperature modulate V-1 open to the coil. On a fall in space temperature, the reverse shall occur.
Firestat T-3 and Freeze Stat: T-4 shall stop the supply fan and R.A. fan and close D-1, D-2, and D-3 should temperatures rise above or fall below their respective settings.

5. A.H.U. #2 CONTROL SEQUENCE:
When the fan is energized electric pneumatic relay EP-1 shall be energized and outdoor air damper D-1 shall open. When the fan is de-energized D-1 shall close.
Winter Cycle:
With summer-winter switch S-1 in the winter position room thermostat T-1 shall re-set submaster thermostat T-2 located in the discharge air. T-2 in conjunction with T-1 shall, on a fall in space temperature, modulate 3-way valve V-1 open to the coil. On a rise in space temperature, the reverse shall occur.
Summer Cycle:
Relay R-1 shall be indexed so that the action of T-2 is reversed through relay R-2. T-2 is reversed through relay R-2. T-2 in conjunction with T-1 shall, on a rise in space temperature, modulate V-1 open to the coil. On a fall in space temperature the reverse shall occur. Freezestat T-3 and firestat T-4 shall stop the unit fan and close the outdoor air damper if the temperature falls below or rises above their respective setting.

6. A.H.U. #3 CONTROL SEQUENCE:
Winter Cycle: The unit fan shall run continuously. Outdoor air damper D-1 shall initially open to a minimum. Position as determined by switch S-1. Return air damper D-2 shall close a proportionate amount. Room thermostat T-1 shall reset the control point of submaster T-2.
T-2 shall on a rise in temperature first modulate 3-way valve V-1 toward the by-pass position on a continued rise in temperature the reverse shall occur.
Summer Cycle: Relay R-1 shall place V-1 under direct control of T-1. Relay R-2 shall prevent D-1 from opening beyond its minimum open position. T-1 shall on a rise in space temperature modulate V-1 open to the coil. On a fall in space temperature, the reverse shall occur.

Firestat T-3 and Freezestat T-4 shall stop the fan and close D-1 should temperatures rise above or fall below their respective settings.

7. FAN COIL UNIT CONTROL SEQUENCE:
Winter Cycle:
Room thermostat T-1 shall on a rise in temperature modulate 3-way valve V-1 toward by-pass position. On a fall in space temperature, the reverse shall occur.
Summer Cycle: Room thermostat shall on a rise in space temperature modulate three-way valve open to the coil. On a fall in temperature, the reverse shall occur.
Unit fan shall energize motorised O.A. Damper to open.

FILM #: _______ FRAME #: ____________

NOTES: TYPE --> window unit, split-dx,
COOLING SOURCE --> electric, ga
STARTER & CONTROL --> momentary
24 v stat,

Bldg No.: 2359

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

EXHAUST FANS:

UNIT NO.	TYPE	AREA	S.P.	CFM	HP	STARTER & CONTROL	SETPOINT
1 & 2	PROP	TOILETS	1/4"	200	~1/12	W/LIGHTS	—
3 & 4	"	JAN. & TLT	1/4"	100	~1/12	W/LIGHTS	—
5 & 6	CENT	ACTIVITY RM	1/4"	375	~1/6	WALL SW.	

FILM #: ________ FRAME #: ________

NOTES: TYPE --> propeller, centrifugal, etc.
STARTER & CONTROL --> momentary, maintained, line v stat, 24 v stat, self contained, etc.

Bldg No.: 2359

GENERAL ENERGY CONSERVATION OPPORTUNITY CHECKLIST

Bldg Name: IVY CHAPEL Bldg #: P-2359 Contact: Johnson Phone #: 3356 Surveyed By: PK Date: 12/18/

ECO TITLE	ANNEX A	DATE	ANNEX B	DATE	COMMENTS
INSULATION	A1		# B01		N/A
STORM WINDOWS or DOUBLE GLAZING	A2		# B02		N/A — Door glass is single pane (Vesti
WEATHER STRIPPING and CAULKING	A3		# B03		N/A building is pressurized
INSULATED PANELS	A4		# B04		N/A — Glass used for daylighting
VESTIBULES or REVOLVING DOORS	A5		# B05		N/A
LOAD DOCK SEALS (Strip Door or Air Cu)	A6		B06		N/A
REDUCTION of GLASS AREA	A7		B07		N/A
REPLACE KITCHEN LIGHT FIXTURES	A8		# B08		N/A
SHUTDOWN DHW or MOD CTRLS (Non FH)	A9		B09	✓	Reduce Temp to 105°F
REDUCE LIGHTING LEVELS	A10		# B11		N/A
REPLACE INCANDESCENT LIGHTING	A11		# B12		N/A
USE MORE EFFICIENT LIGHTING SOURCE	A12		# B10	✓	Replace Inc. with Twin Tube F
HIGH EFFICIENCY MOTOR REPLACEMENT	A13		B13	✓	All motors
NIGHT SETBACK/SETUP THERMOSTATS *	A14		# B14	✓	Set back to 65/55 and up to 78
INFRARED HTRS (Motor Rep Shops & Whse)	A15		# B15		N/A
ECONOMIZER CYCLES (Dry Bulb Type)	A16		# B16	✓	Install on 3 units
CONTROL HOT WATER CIRC PUMP *	A17		# B17		N/A
FM RADIO CONTROLS	A18		B18		N/A
RADIATOR CONTROLS	A19		B19		N/A
DECENTRALIZE DHW HTRS (POU Htrs) *	A20		B		N/A
HEAT RECLAIM from HOT REFRIG GAS	A21		# B20		N/A
REDUCE AIR FLOW *	A22		# B21		N/A
PREVENT AIR STRATIFICATION *	A23		# B22		N/A
INSTALL TIME CLOCKS	A24		B23		N/A
CHILLER REPLACEMENT	A25		B		N/A
REPLACE ABSORPTION CHILLER	A26		B38		N/A
>INSULATE STEAM LINES	A27		B26		N/A
RETURN CONDENSATE	A28		B27		N/A
TRANSFORMER OVERVOLTAGE	A29		B31		N/A
TRANSFORMER LOADING	A30		B30		N/A
REVISE OR REPAIR HVAC CONTROLS	A31		B32	✓	Close OA on Cabinet heaters (6
WASTE HEAT RECOVERY *	A32		B33		N/A
ADD ADDITIONAL LIGHT SWITCHES	A33		B35		N/A
HVAC INIT/BLDGS WITH SEPARATE BOILERS	A34		# B37		N/A
- STANDARD SOLUTIONS for EXT LIGHTS	A35		# B36		N/A — photocells now
BOILER OXYGEN TRIM CONTROLS	A		B24		N/A
REVISE BOILER CONTROLS	A		B25		N/A
PRE-HEAT DHW	A		B28		N/A
HEAT PUMPS	A		# B29		N/A
EMCS	A		B39		See separate Study
HOT WATER RECIRC PUMPS	A		M40,17		
HPS STREET LIGHTS	A		M41		
ELECTRIC OUTLET INSULATION	A		M42		

<*> Denotes ECO's studied by Burns & McDonnel
<#> Denotes ECO's common to Military Family Housing

**** FMEA SIMILAR BUILDINGS SURVEY FORM ****

10/92 AJN

NERAL BUILDING DATA

BLDG #: 1850 (P) BLDG NAME: UNIT CHAPEL DATE: ~~2-13-85~~ JOB #: 124
SURVEYED BY: ~~DD~~ BLDG CONTACT: ______ TELEPHONE EXT: ______
BLDG USE: CHAPEL # FLOORS: 1.1 # PEOPLE: ___ BLDG AREA: 8677 SF

BLDG OCCUPANCY: S $\boxed{\text{M T W Th F}}$ S 0730 TO 1700
S M T W Th F S 0730 TO 1230

T'STAT SETTING: HTG: 70 / — AUTO SETBACK: N / Y: — / —
CLG: — / —
Temperature,Future,inside,Occupied: 65/78 Temp Present: 72
Temperature,Future,inside,Unoccupied: 55/- AirChange/hR: 0

ARCHITECTURAL

	AREA	U-value	UA
WALL	6003	.071	426
GLASS	1059	1.176	1245
ROOF	8,677	.108	7,462
FLOOR	358	.86	308
SUM	16,097	—	9,441

Avg. Floor-Ceiling Height: 17' Floor type: SLAB Insulated: Y/N
Window frame type: Alum Wood Operable sections: Y / N
Window size: ___ x ___ SP DP CURT Infiltration L M H
Entry doors: 8 # OH Doors: 0 % of Area Conditioned: ___

LIGHTING (*): Type: Fluorescent/Incand. Watts/SF: 2.28 Util Frac: ___

ELECTRICAL EQUIP: OFFICE KW/Unit: ___ #Units: ___ Util Frac: ___

DHW: TYPE: NG/ELEC/CONV Supply Temp: 145° GAL/Person-Day: ___
AFUE: 63.1 %

MECHANICAL

		HEATING	COOLING
	Primary System:	HTHW → HW Conv.	NONE
	Fuel:	NAG (CP	
	Capacity:	390 KBTUH	
	est.Peak Del.Effic:	63.1%	
	Months ON:	8	
	Hours ON:	5808	
AHUs	Hp:	8	
	cfm:	4100	
	Min OA:	20	
	Economizer:	NO	

MISC:

1-SINGLE ZONE UNIT
1- MUAU
1-HVU: 10KCFM, HEAT COIL-336MBH

(*) Lighting -> Same as Bldg P-2359

JOB FT CARSON EEAP UPDATE

SHEET NO. ______ OF ______

E M C ENGINEERS, INC.

Denver • Colorado Springs • Atlanta • Germany

CALCULATED BY AJN DATE 10-7-92

CHECKED BY ______ DATE ______

SCALE ______

P-1850

HTHW control valve V1 has Barber Colman Actuator Type A
- heating today, valve is working.
- Set pt. at 150°F

HW 3-way valve working. controlled by T-STAT T-3 set at 80°F
• Act. Type MP-486

Separate Damper Motor for R.A. Damper (Acts are Type B)

Air System is functioning in Winter mode.
Supply fan SF-1 is off, as per control sequences
Face & Bypass Damper actuator is B/C Type F3
3-Way Valve V-2 on Radiation circuit inoperable (Very Leaky)
Radiation pump control set at 66°F. Shuts pumps off above 66°F.

AHUs serve the Sanctuary only.
Radiation system serves the offices & Kitchen area only.

*** FMEA SURVEY OBSERVATIONS ***

GENERAL BUILDING DATA

Admin/General Purpose 10/92 AJN

BLDG #: S-6220 BLDG NAME: ~~Clinic~~ JOB #: 124
SURVEYED BY: ~~RE/RWW~~ DATE: ~~27 Nov 89~~ BLDG CONTACT: SP5 McEvoy
CONTACT TELEPHONE NUMBER: X4221 BLDG USAGE:
TOT BLDG AREA: 12,361 SF # OF FLOORS: 2 # OF PEOPLE: ~~25 + 100 patient~~
Note: Drawings show 11,494 SF   1st FLR Vacant; 2nd FLR Chaplains.
BUILDING OCCUPANCY: MON - FRI: 0700 TO 1630 FIRST SHIFT: (~6 people per day)
SATURDAY: / TO / SECND SHIFT:
SUNDAY: / TO / THIRD SHIFT:
HOLIDAYS: / TO / HOLIDAYS:

ENVIRONMENTAL CONDITIONS:

	HEATING SETPOINTS				COOLING SETPOINTS			
	WEEKDAYS		WEEKENDS		WEEKDAYS		WEEKENDS	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
PRESENT T'STAT:	76	76	76	76	—	—	—	—
REQUIRED T'STAT:	70	70	70	70				

THERMOSTAT LOCATION(S): None - hand operated Radiator valves
HUMIDIFICATION REQUIREMENTS (RH): — H'STAT LOCATION(S): —

LIGHTING:

	AREA(SF)	LAMP TYPE	#LMPS	W/SF	SCHEDULE
1)	11,494	fluor and incand.	/	1.33	ON 0700 OFF 1630
2)			/		ON OFF
3)			/		ON OFF
4)			/		ON OFF

DATA SOURCE: X OBSERVATION ___ASHRAE X OTHER (est: 10% on at night)
SEE ATTACHED SCHEDULE? X Y ___N See page 3

ELECTRIC EQUIPMENT:

	AREA(SF)	TYPE	(KW)	W/SF	SCHEDULE
1)	11,494	est: 0.75 watts/SF	8.620		ON 0700 OFF 1630
2)					ON OFF
3)					ON OFF
4)					ON OFF

DATA SOURCE: ___OBSERVATION ___ASHRAE ___OTHER (est: 5% on at night)
SEE ATTACHED SCHEDULE? ___Y ___N

INTERNAL MASS: MATERIAL: Equipment/frame ESTIMATED MASS: _ (L, M, H)

INFILTRATION: LOCATION(S): around windows, doors, attic Vents and through walls.

ESTIMATED RATE: _____(L, M, H) or
X AIR CHANGES or
_____CFM/LIN FT CRACK

Building Volume = 120,687 CF

1.5 Air changes due to windows
0.25 Air changes due to doors and walls (.15 at night)
0.25 Air changes due to ceiling screen vents
2.0 Air Change total

Bldg No.: S-6220

*** FMEA SURVEY OBSERVATIONS ***

GENERAL BUILDING DATA

CONSTRUCTION:

WALLS:

	CONSTRUCTION COMPONENT	WIDTH	HEIGHT	NET AREA (SF)	U-VALUE
N:	Concrete block, airspace,	163.33'	21'	2995.2	0.24
E ~~S~~:	panelling.	44.66'	21'	578.8	0.24
S ~~E~~:		163.33'	21'	3006.8	0.24
W:		44.66'	21'	631.0	0.24

ROOFS:

CONSTRUCTION COMPONENT	WIDTH	HEIGHT	AREA (SF)	U-VALUE
Shingle Roof, 3 1/2" Blown	37.83'	12.33'	466.4	0.069
insulation, ceiling brd	32.33'	163.33'	5,280.6	0.069

WINDOWS: AREA (SF) TYPE New Windows - Dbl. pane Alum Vert. Sliders.

	AREA (SF)	TYPE	SF	DF	DRAPES
N:	434.8 (*)	~~Dbl hg wood~~	~~✓~~	✓	No
E ~~S~~:	359.2 (**)		~~✓~~	✓	
S ~~E~~:	423.2 (***)		~~✓~~	✓	
W:	307 (****)		~~✓~~	✓	

U = 1.18

FLOOR TYPE: ___ SLAB ✓ CRAWL SPACE ___ BASEMENT ___ OTHER*

AREA: 5,747 SF   U = 0.4698

PERIMETER: _______ LF INSULATION? ___Y___N ___IN ___________

SPECIAL AREAS: ___________

ADDITIONAL NOTES: (39.5" x 60.5") - Windows plus 39.5" x 16" upper view panes in reception area 2 N & 2 W.
- Steam lines are located in crawl space of buildings, therefor the crawl space temperature is estimated to be approximately 50°F in the winter. Several Screen Vents are open to the attic (6 - 21" x 14.5").

FILM #: _______ FRAME #: ___________

SKETCHES:

(*) (20)(16.6 SF) + (8)(7.6 SF) + (1)(42 SF) = 434.8 SF

(**) (6)(42 SF) + (8)(13.4 SF) = 359.2 SF

(***) (20)(16.6 SF) + (12)(7.6 SF) = 423.2 SF

(****) (5)(42 SF) + (6)(13.4 SF) + (1)(16.6 SF) = 307 SF

* Specify in "Additional Notes"

Bldg No.: S-6220

*** FMEA SURVEY OBSERVATIONS ***

GENERAL BUILDING DATA

LIGHTING SCHEDULE

Page ___ of ___

AREA: (A) MAIN 11,494 SF (B) MEZZ ______ SF
(A) ____ X ____ (B) ____ X ____

DATA SOURCE: ___ DRAWINGS ___ SURVEY TOUR

Mark	#lamps	W/Fix	#Fix	Flr #	Comments
C	∅		∅		
D	∅		∅		
F	304	152	76	fluor	11,552 watts (4 lamp/fix)
G	60	76	30	fluor	2,280 watts (2 ")
H	∅		∅		
J	10	76	5	fluor	380 watts (2 lamps/fix)
K	1	100	1	incand	100 watts
L	8	152	2	fluor	304 watts (4 lamps/fix)
M	6	300	2	incand	600 watts (3 bulbs)
Q	3	40	3	fluor	120 watts (1 lamp/fix)

(A) TOTAL: 15,336 Watts/ 11,494 SF= 1.33 W/SF

(B) TOTAL: ______ Watts/ ______ SF= ______ W/SF

ADDITIONAL NOTES:

*** FMEA SURVEY OBSERVATIONS ***

GENERAL BUILDING DATA

MISCELLANEOUS BASE LOADS:
DOMESTIC HOT WATER:
MANUFACTURER & MODEL ______
FUEL SOURCE ✓ NAT GAS ___ ELEC ___ OIL ___ STM GEN ✓ OTHER*
SUPPLY TEMPERATURE _____ °F, DISTANCE FROM HEATER _____ FT
INPUT ______ RECOVERY RATE ______ OPERATING SCHEDULE ______

EXTERIOR LIGHTING:
TYPE ______ NO ___ SCHEDULE ______ CONTROL ______
TYPE ______ NO ___ SCHEDULE ______ CONTROL ______
TOTAL KW ______
FUNCTION OF LIGHTS ___ SECURITY ___ PARKING LOT ___ ENTRY ___ OTHER*

ADDITIONAL COMMENTS: DHW from steam from plant, 100°F at tap, 105° @ tank (storage)

Note: The wood windows in this building are leaky but are a little tighter than the temporary building's windows (made of wood).

Misc. Internal Gains: (ex: computers & printers) use ~1.5W/SF

FILM #: ______ FRAME #: ______

ADDITIONAL SKETCHES:

Note: The building's steam radiators are operated by hand valves. We estimate that the space temperature is maintained (more or less) at 76°F during the winter months. There is not a central thermostat for the building.

* Specify in "Additional Comments"

Bldg No.: S-6220

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

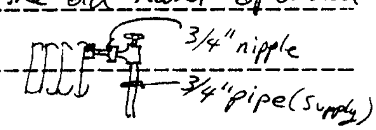
UNITARY HEATING EQUIPMENT:

UNIT NO.	TYPE	OUTPUT CAPACITY	HEATING SOURCE	CFM	HP	STARTER & CONTROL	SETPOINT

✓ There are 52 hand operated steam radiators in the building. The majority are located directly beneath existing windows. Total building capacity:

$$q = (52 \text{ radiators})(\approx 50 \text{ sq ft/radiator})(240 \text{ BTU/hr/sq ft})$$
$$= 624{,}000 \text{ BTU/hour.}$$

Control Valves on the cast iron radiators are the old hand operated one, 3/4" in size; Connection to radiator –



FILM #: _______ FRAME #: _______________

NOTES: TYPE --> unit heater, unit ventilator, duct furnace, wall furnace, etc.
HEATING SOURCE --> electric, gas fired, oil, steam, hot water, etc.
STARTER & CONTROL --> momentary, maintained, line v stat, 24 v stat, self contained, etc.

Bldg No.: S-6220

**** FMEA SIMILAR BUILDINGS SURVEY FORM ****

10/92 AJN

GENERAL BUILDING DATA

BLDG #: 6221 (S) BLDG NAME: ~~HOSP. CLINIC~~ Division Medical Supply Office DATE: ~~2-15-85~~ 12 JOB #: 124

SURVEYED BY: DD BLDG CONTACT: TELEPHONE EXT:

BLDG USE: ADM + PHARM. # FLOORS: 1 # PEOPLE: ~~60~~ BLDG AREA: 5198 SF

BLDG OCCUPANCY: S M T W Th F S 0700 TO 2300 M/Tue. (9:00 -1630) & Fri. Wed. 9:00 - 1200 Thur. Closed

S M T W Th F S TO

T'STAT SETTING: HTG: 76 / — AUTO SETBACK: N / Y: — / —

CLG: — / —

Temperature,Future,inside,Occupied: 70/78 Temp Present: 76°

Temperature,Future,inside,Unoccupied: 55/- AirChange/hR: 1.92

ARCHITECTURAL

	AREA	U-value	UA
WALL	3,365	.229	771
GLASS	663	1.176	780
ROOF	5312	.074	393
FLOOR	5312	.41	2178
SUM	14,652	—	4,122

Avg. Floor-Ceiling Height: 9.8' Floor type: C.S. Insulated: Y/N

Window frame type: Alum ~~Wood~~ Dbl-pane Alum-Vert. Slides. Operable sections: Y / N

Window size: See Below SP DP CURT Infiltration L M H

Entry doors: 2 # OH Doors: Ø % of Area Conditioned:

LIGHTING: Type: FLUOR. 16- 4 LAMP 28- 2 LAMP Watts/SF: .92 Util Frac:

ELECTRICAL EQUIP: OFFICE KW/Unit: #Units: Util Frac:

DHW: TYPE: NG/ELEC/CONV Supply Temp: GAL/Person-Day:

AFUE: %

MECHANICAL

		HEATING	COOLING
	Primary System:	HTHW → STM Conv	4 SWAMP COOLERS
	Fuel:	NaG (CP)	Electric
	Capacity:		
	est.Peak Del.Effic:	68.86%	
	Months ON:	8	4
	Hours ON:	5808	2952
AHUs	Hp:	—	
	cfm:	—	
	Min OA:	—	
	Economizer:	—	

MISC:

31 WINDOWS — 46"x67"

SUMMER - TOO HOT IN AREAS, TOO COOL IN FRONT

WINTER - Controls unstable - Wide temp variation

6 - Fan Coil Units (Steam) w/ TSTAT Control on Wall

6 - RADIATORS w/ original Hand-Operated Values.

**** FMEA SIMILAR BUILDINGS SURVEY FORM ****

10/92 AJN

GENERAL BUILDING DATA

BLDG #: 6222 (S) BLDG NAME: ~~HOSP. CLINIC~~ Adm. Gen Purpose. DATE: ~~2-15-85~~ JOB #: 124
SURVEYED BY: AM/WW BLDG CONTACT: SSG. BEAULIEU TELEPHONE EXT: 4320
BLDG USE: CLINIC # FLOORS: 2 # PEOPLE: ~~90~~ 60 BLDG AREA: 9225 SF

BLDG OCCUPANCY: S M T W Th F S 0730 TO 1600
S M T W Th F S ____ TO ____

T'STAT SETTING: HTG: 68 / ___ AUTO SETBACK: N / Y: ___ / ___
CLG: ___ / 72
Temperature,Future,inside,Occupied: 70/78 Temp Present: 70
Temperature,Future,inside,Unoccupied: 55/- AirChange/hR: 1.92

ARCHITECTURAL

	AREA	U-value	UA
WALL	9,427	.229	2,159
GLASS	2,220	1.176	2,611
ROOF	8416	.074	623
FLOOR	8416	.41	3451
SUM	28,479	–	8,844

Avg. Floor-Ceiling Height: 9.8' Floor type: C.S. Insulated: Y/N
Window frame type: Alum Wood Operable sections: Y / N
Window size: See Below SP DP CURT Dble pane Alum. Vert. sliders Infiltration L M H
Entry doors: 6 # OH Doors: 0 % of Area Conditioned: ____

LIGHTING: Type: FLUO. 19-4 LAMP 12-1 LAMP Watts/SF: .40 Util Frac: ____

ELECTRICAL EQUIP: KW/Unit: ____ #Units: ____ Util Frac: ____

DHW: TYPE: NG/ELEC/CONV Supply Temp: ____ GAL/Person-Day: ____
AFUE: ____ %

MECHANICAL

		HEATING	COOLING
	Primary System:	HTHW→STM Conv.	3-SWAMP COOLERS
	Fuel:	NaG (CP)	
	Capacity:		
	est.Peak Del.Effic:	65% %	
	Months ON:	8	4
	Hours ON:	5808	2952
AHUs	Hp:	—	
	cfm:	—	
	Min OA:	—	
	Economizer:	—	

MISC:

WINDOWS: 98 - 40"x62"; 37 - 20"x62"; 16 - 31"x62"

PAGE 1 of 1

**** FMEA SIMILAR BUILDINGS SURVEY FORM ****

10/92 AJN

GENERAL BUILDING DATA

BLDG #: 6223 (S) BLDG NAME: ~~HOSP. CLINIC~~ Directorate of Civilian Personnel DATE: ~~2-15-85~~ 20 JOB #: 124
SURVEYED BY: ~~AM/WW~~ BLDG CONTACT: MR. STANFORD TELEPHONE EXT: 4690
BLDG USE: OB CLINIC # FLOORS: 1 # PEOPLE: ~~50~~ BLDG AREA: 9574 SF

BLDG OCCUPANCY: S M T W Th F S ~~0715~~ 0730 TO ~~1600~~ 430
S M T W Th F S ______ TO ______

T'STAT SETTING: HTG: 78 / — AUTO SETBACK: N / Y: ____/____
CLG: ____/____
Temperature,Future,inside,Occupied: 75/78 Temp Present: 78°
Temperature,Future,inside,Unoccupied: 55/- AirChange/hR: 1.92

ARCHITECTURAL

	AREA	U-value	UA
WALL	4,561	.229	1,044
GLASS	1,073	1.176	1,262
ROOF	8416	.074	623
FLOOR	8,416	.41	3451
SUM	22,466	—	6,380

Avg. Floor-Ceiling Height: 9.8' Floor type C.S. Insulated: Y/N
Window frame type: Alum ~~Wood~~ New Windows Dbl-Pane Alumin. Sliders (Vertical) Operable sections: Y / N
Window size: See Below ~~SP~~ DP CURT Infiltration L M H
Entry doors: 4 # OH Doors: 0 % of Area Conditioned: ____

LIGHTING: Type: FLUO. 8-4 LAMP 34WATT 36-2 LAMP Watts/SF: ____ Util Frac: ____

ELECTRICAL EQUIP: KW/Unit: ____ #Units: ____ Util Frac: ____

DHW: TYPE: NG/ELEC/CONV Supply Temp: 120° GAL/Person-Day: ____
AFUE: ____%

MECHANICAL

	HEATING	COOLING
Primary System:		
Fuel:	Nag (CP)	
Capacity:		
est.Peak Del.Effic:	68.86 %	
Months ON:	8	4
Hours ON:	5808	2952
AHUs Hp:		
cfm:		
Min OA:		
Economizer:		

MISC:

WINDOWS: 8 – 40" x 55"; 41 – 40" x 62"; 8 – 31" x 62";
16 – 20" x 62"

PAGE 1 of 1

**** FMEA SIMILAR BUILDINGS SURVEY FORM ****

10/92 AJN

GENERAL BUILDING DATA

BLDG #: 6224 (S) BLDG NAME: ~~HOSP. CLINIC~~ Adm. Gen. Purpose DATE: ~~2-15-85~~ JOB #: 124
SURVEYED BY: ~~WW/AA~~ BLDG CONTACT: SP4 HIU TELEPHONE EXT: 3516
BLDG USE: ~~PED CLINIC~~ # FLOORS: 2 # PEOPLE: ~40 people BLDG AREA: 24548 SF

BLDG OCCUPANCY: S M T W Th F S 0730 TO ~~1630~~ 1630
S M T W Th F S ____ TO ____

T'STAT SETTING: HTG: 80° / — AUTO SETBACK: N / Y: — / —
CLG: 77 / —
Temperature,Future,inside,Occupied: 70/78 Temp Present: 78°
Temperature,Future,inside,Unoccupied: 55/- AirChange/hR: 1.92

ARCHITECTURAL

	AREA	U-value	UA
WALL	12,386	.229	2,836
GLASS	2,548	1.176	2,996
ROOF	11416	.074	845
FLOOR	11416	.41	4681
SUM	37,766	—	11,358

Avg. Floor-Ceiling Height: 9.8' Floor type: C.S. Insulated: Y/N
Window frame type: Alum Wood Dbl. pane Alum. Vertical Sliders Operable sections: Y / N
Window size: See Below SP DP CURT Infiltration L M H
Entry doors: 5 # OH Doors: 0 % of Area Conditioned: 100

LIGHTING: Type: FLUO. 4-1 LAMP 110-2 LAMP Watts/SF: .44 Util Frac: ____

ELECTRICAL EQUIP: KW/Unit: ____ #Units: ____ Util Frac: ____

DHW: TYPE: NG/ELEC/CONV Supply Temp: ____ GAL/Person-Day: ____
AFUE: ____ %

MECHANICAL

	HEATING	COOLING
Primary System:	HTHW → STM. Conv	2-SWAMP COOLERS
Fuel:	NaG (CP)	Electric.
Capacity:		
est.Peak Del.Effic:	68.86 %	
Months ON:	5	4
Hours ON:	5808	2952
AHUs Hp:	—	
cfm:	—	
Min OA:	—	
Economizer:	—	

MISC:

WINDOWS: 91 - 40" x 62"; 24 - 20" x 62";
58 - 31" x 62"

Cast Iron Radiators w/ 3/4" Honeywell radiator control Valves. (COVERED W/ ALUM. FOIL)
South half of Bldg. is extremely Hot; North half of Bldg. is extremely Cold.

PAGE 1 of 1

**** FMEA SIMILAR BUILDINGS SURVEY FORM ****

10/92 AJN

GENERAL BUILDING DATA

BLDG #: 6233 (S) BLDG NAME: ~~HOSP. CLINIC~~ VACANT DATE: ~~2-14-85~~ JOB #: 124
SURVEYED BY: ~~AM/WW~~ BLDG CONTACT: SP4 WHITE TELEPHONE EXT: 4793
BLDG USE: O.R., X-RAY # FLOORS: 2 # PEOPLE: 18 BLDG AREA: 24800 SF

BLDG OCCUPANCY: S M T W Th F S ~~1600~~ TO ~~0700~~ 2 PEOPLE
S M T W Th F S ~~0715~~ TO ~~1600~~ 18 PEOPLE

T'STAT SETTING: HTG: 78 / — AUTO SETBACK: N / Y: ___/___
CLG: — / —
Temperature,Future,inside,Occupied: 76/78 Temp Present: 78
Temperature,Future,inside,Unoccupied: 55/- AirChange/hR: 1.92

ARCHITECTURAL

	AREA	U-value	UA
WALL	15,911	.229	3,644
GLASS	2,215	1.176	2,605
ROOF	10,800	.074	799
FLOOR	10,800	.41	4,428
SUM	39,726	—	11,476

Avg. Floor-Ceiling Height: 9.8' Floor type: C.S. Insulated: Y/N
Window frame type: Alum Wood Operable sections: Y / N
Window size: See Below SP DP CURT Infiltration L M H
Entry doors: 6 # OH Doors: Ø % of Area Conditioned: 100

LIGHTING: Type: FLUO. 8-1LAMP 100-2LAMP 34W Watts/SF: .30 Util Frac: ___

ELECTRICAL EQUIP: OFFICE KW/Unit: ___ #Units: ___ Util Frac: ___

DHW: TYPE: NG/ELEC/CONV Supply Temp: ___ GAL/Person-Day: ___
AFUE: ___ %

MECHANICAL

	HEATING	COOLING
Primary System:	HTHW → STM Conv	2 TRANE ACU
Fuel:	NAG (CP)	Electric
Capacity:		
est.Peak Del.Effic:	68.86%	
Months ON:	8	
Hours ON:	5808	
AHUs Hp:	—	7.5 H.P
cfm:	—	
Min OA:	—	
Economizer:	—	

MISC:

WINDOWS: 127-40"x62"; 2-38"x52"
2 TRANE ACU
New Windows - double pane.
Appears to have manual rad. control valves.
Entire bldg. locked up.

**** FMEA SIMILAR BUILDINGS SURVEY FORM ****

10/92 AJN

GENERAL BUILDING DATA

BLDG #: 6236 (S) BLDG NAME: ~~HOSP CLINIC~~ VACANT DATE: ~~2-14-85~~ JOB #: 124
SURVEYED BY: ~~AM/WW~~ BLDG CONTACT: SP4 CHAMBELAIN TELEPHONE EXT: 2414
BLDG USE: ~~CLINIC~~ # FLOORS: 2 # PEOPLE: 35 BLDG AREA: 19988 SF

BLDG OCCUPANCY: S M T W Th F S 0730 TO 1630 ? Entire Bldg locked up
S M T W Th F S ____ TO ____

T'STAT SETTING: HTG: 78 / — AUTO SETBACK: N / Y: — / —
CLG: — / —
Temperature,Future,inside,Occupied: 70/78 Temp Present: 74
Temperature,Future,inside,Unoccupied: 55/- AirChange/hR: 1.92

ARCHITECTURAL

	AREA	U-value	UA
WALL	9,826	.229	2,250
GLASS	2,391	1.176	2,812
ROOF	9320	.074	690
FLOOR	9320	.41	3821
SUM	30,857	—	9,573

Avg. Floor-Ceiling Height: 9.8' Floor type. C.S. Insulated: Y/N
Window frame type: Alum Wood Operable sections: Y / N
Window size: See Below SP DP CURT Infiltration L M H
\# Entry doors: 5 # OH Doors: Ø % of Area Conditioned: 100%

LIGHTING: Type: FLUO 8-4LAMP ~~34W~~ 102-2 LAMP 34W Watts/SF: .38 Util Frac: ____

ELECTRICAL EQUIP: OFFICE KW/Unit: ____ #Units: ____ Util Frac: ____

DHW: TYPE: NG/ELEC/CONV Supply Temp: ____ GAL/Person-Day: ____
AFUE: ____ %

MECHANICAL

		HEATING	COOLING
	Primary System:	CENTRAL PLANT	NONE
	Fuel:	NG (CP)	
	Capacity:		
	est.Peak Del.Effic:	68.86%	
	Months ON:	8	
	Hours ON:	5808	
AHUs	Hp:		
	cfm:		
	Min OA:		
	Economizer:		

MISC:

WINDOWS: 15 - 31"x54"; 107 - 40"x62"; 28 - 31"x62"

Double pane windows - Alum. Vertical sliders, caulked.
Manual control valves

**** FMEA SIMILAR BUILDINGS SURVEY FORM ****

10/92 AJN

GENERAL BUILDING DATA

BLDG #: 6237 (S) BLDG NAME: ~~HOSP. CLINIC~~ VACANT DATE: ~~2-14-85~~ JOB #: 124
SURVEYED BY: ~~AM/WW~~ BLDG CONTACT: SSG LEE TELEPHONE EXT: 4326
BLDG USE: ~~CLINIC~~ # FLOORS: 2 # PEOPLE: 60 BLDG AREA: 19988 SF

BLDG OCCUPANCY: S M T W Th F S 0630 TO 1730 ? Entire Bldg. locked up.
S M T W Th F S ____ TO ____

T'STAT SETTING: HTG: 78 / — AUTO SETBACK: N / Y: — / —
CLG: — / —
Temperature,Future,inside,Occupied: 70/78 Temp Present: 78°
Temperature,Future,inside,Unoccupied: 55/- AirChange/hR: 1.92

ARCHITECTURAL

	AREA	U-value	UA
WALL	9,826	.229	2,250
GLASS	2,391	1.176	2,812
ROOF	9,320	.074	690
FLOOR	9320	.41	3821
SUM	30,857	—	9,573

Avg. Floor-Ceiling Height: 9.8' Floor type: C.S. Insulated: Y/N
Window frame type: Alum Wood Operable sections: Y / N
Window size: See Below SP DP CURT Infiltration L M H
Entry doors: 5 # OH Doors: Ø % of Area Conditioned: 100

LIGHTING: Type: FLUO 98-4 LAMP 48-2 LAMP 34 W Watts/SF: .84 Util Frac: ____

ELECTRICAL EQUIP: OFFICE KW/Unit: ____ #Units: ____ Util Frac: ____

DHW: TYPE: NG/ELEC/CONV Supply Temp: 110° GAL/Person-Day: ____
AFUE: ____ %

MECHANICAL

	HEATING	COOLING
Primary System:	CENTRAL PLANT	NONE
Fuel:	NAG (CP)	
Capacity:		
est.Peak Del.Effic:	68.86 %	
Months ON:	8	
Hours ON:	5808	
AHUs Hp:	—	
cfm:	—	
Min OA:	—	
Economizer:	—	

MISC:

WINDOWS: 15- 31"x54"; 107-40"x62"; 28-31"x62"
Manual Radiator control valves
Cast iron radiators.
Windows are double pane Alum. sliders, caulked.

**** FMEA SIMILAR BUILDINGS SURVEY FORM ****

10/92 AJW

GENERAL BUILDING DATA

BLDG #: 6243 (S) BLDG NAME: HOSP. CLINIC DATE: ~~2-13-85~~ JOB #: 124
SURVEYED BY: AM/WW BLDG CONTACT: ______ TELEPHONE EXT: ______
BLDG USE: HOSP WARD # FLOORS: 2 # PEOPLE: 23 BLDG AREA: 25490 SF

BLDG OCCUPANCY: S M T W Th F S 0730 TO 1640
S M T W Th F S ______ TO ______

T'STAT SETTING: HTG: 75 / — AUTO SETBACK: N / Y: — / —
CLG: — / —
Temperature,Future,inside,Occupied: 70/78 Temp Present: 74
Temperature,Future,inside,Unoccupied: 55/- AirChange/hR: 1.92

ARCHITECTURAL

	AREA	U-value	UA
WALL	16,352	.229	3,745
GLASS	1,774	1.176	2,086
ROOF	8212	.074	608
FLOOR	8212	.41	3367
SUM	34,550	—	9,815

Avg. Floor-Ceiling Height: 9.8' Floor type: C.S. Insulated: Y/N
Window frame type: Alum Wood Operable sections: Y / N
Window size: See Below SP DP CURT Infiltration L M H
Entry doors: 6 # OH Doors: Ø % of Area Conditioned: 100

LIGHTING: Type: FLUORESCENT Watts/SF: 43 Util Frac: ____

ELECTRICAL EQUIP: OFFICE KW/Unit: ____ #Units: ____ Util Frac: ____

DHW: TYPE: NG/ELEC/CONV Supply Temp: ____ GAL/Person-Day: ____
AFUE: ______ %

MECHANICAL

	HEATING	COOLING
Primary System:	CENTRAL PLANT	NONE
Fuel:	NaG	
Capacity:		
est.Peak Del.Effic:	68.86 %	
Months ON:	8	
Hours ON:	5808	
AHUs Hp:	—	
cfm:	—	
Min OA:	—	
Economizer:	—	

MISC:

WINDOWS; 103 – 40" x 62"
New Windows - Double pane.
1st FLR Vacant; 2nd FLR - Dental Clinic 3 7:15am-4:00pm 60 TO 75 patients per day.
(Inprocessing) 10 TO 11 staff
Manual control valves.
1st FLR occupied summer only - Reservists, but could change.

PAGE 1 of 1

*** FMEA SURVEY OBSERVATIONS ***

GENERAL BUILDING DATA — Temp. Barracks: Top FLR & 1ST FLR So. Wing. 1ST FLR No. Wing. appears to be an abandon Day care.

BLDG #: S-6230 BLDG NAME: ~~Ward (Hospital)~~ JOB #: 124
SURVEYED BY: RT/RWW DATE: 27 NOV 84 BLDG CONTACT: Maj. Henderson.
CONTACT TELEPHONE NUMBER: X4294 BLDG USAGE: pediatrics/surgical
TOT BLDG AREA: 21,450 SF # OF FLOORS: 2 # OF PEOPLE: ~~45 + 50~~ pat. 60 people
(Drawings show 18,264)

BUILDING OCCUPANCY: MON - FRI: ~~0001~~ 1630 TO ~~2400~~ 0600 FIRST SHIFT: ____
SATURDAY: | TO | SECND SHIFT: ____
SUNDAY: | TO | THIRD SHIFT: ____
HOLIDAYS: V TO V HOLIDAYS: ____

ENVIRONMENTAL CONDITIONS:

	HEATING SETPOINTS				COOLING SETPOINTS			
	WEEKDAYS		WEEKENDS		WEEKDAYS		WEEKENDS	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
PRESENT T'STAT:	76	76	76	76				
REQUIRED T'STAT:	70	70	70	70				

THERMOSTAT LOCATION(S): none - hand operated steam Radiators.
HUMIDIFICATION REQUIREMENTS (RH): --- H'STAT LOCATION(S): ____

LIGHTING:

	AREA (SF)	LAMP TYPE	#LMPS	W/SF	SCHEDULE
1)	21,450			0.055	ON 0001 OFF 2400
2)					ON OFF
3)					ON OFF
4)					ON OFF

DATA SOURCE: ___OBSERVATION ___ASHRAE ___OTHER — 24 hour operation
SEE ATTACHED SCHEDULE? ___Y X N — See page 3

ELECTRIC EQUIPMENT:

	AREA (SF)	TYPE	(KW)	W/SF	SCHEDULE
1)	21,450	Est: 0.5 watt/SF	10.7		ON 0001 OFF 2400
2)					ON OFF
3)					ON OFF
4)					ON OFF

DATA SOURCE: X OBSERVATION ___ASHRAE ___OTHER — 24 hour operation
SEE ATTACHED SCHEDULE? ___Y X N

INTERNAL MASS: MATERIAL: Equipment/frame ESTIMATED MASS: (L, M, H) — L

INFILTRATION: LOCATION(S): around windows and through walls.

ESTIMATED RATE: ____(L, M, H) or
✓ AIR CHANGES or
____CFM/LIN FT CRACK

Building Volume = 73,056 CF

1.5 Air changes due to windows
.15 Air changes due to walls (No exterior doors in active use)
1.65 Total air changes

***** FMEA SURVEY OBSERVATIONS *****

GENERAL BUILDING DATA

CONSTRUCTION:

WALLS:

	CONSTRUCTION COMPONENT	WIDTH	HEIGHT	NET AREA (SF)	U-VALUE
N:	Concrete block, Airspace,	42.3/10	21/21	767	0.24
E:	paneling	252	21	4,468	0.24
S:		42.3/10	21/21	767	0.24
W:		252	21	4,492	0.24

ROOFS:

CONSTRUCTION COMPONENT	WIDTH	HEIGHT	AREA (SF)	U-VALUE
Shingle Roof, 3 1/2" Blown	262	32.3	8,463	0.069
insulation, Ceiling board.	10	27.67	276	0.069
	10	39.3	393	0.069
		Total	9,132	0.069

WINDOWS:

	AREA (SF)	TYPE			
N:	332 (*)	Wood dbl hung	SF __	DF __	DRAPES ____
E:	824 (**)		SF __	DF __	DRAPES ____
S:	332 (*)		SF __	DF __	DRAPES ____
W:	800 (***)		SF __	DF __	DRAPES ____

New double pane Alum. Vert. Sliders

FLOOR TYPE: ___ SLAB X CRAWL SPACE ___ BASEMENT ___ OTHER*
AREA: 9132 SF
U = 0.4098

PERIMETER: _______ LF INSULATION? ___ Y ___ N ___ IN ___________

SPECIAL AREAS: ___________

ADDITIONAL NOTES: Enclosed walkways bring traffic to the building, therefore no infiltration is attributed to doors. The covered walkways are not included in this analysis.

Note: Much of the buildings area is locked and not used. It is assumed that heat is still supplied to these areas.

FILM #: ________ FRAME #: ___________

SKETCHES:

(*) (2)(32) + (2)(24) + (2)(40) + (2)(30) = 332 SF

(**) (49)(16) + (10)(12) = 824 SF

(***) (32)(16) + (18)(12) + (6)(12) = 800 SF

*Specify in "Additional Notes"

Bldg No.: S-6230

*** FMEA SURVEY OBSERVATIONS ***

GENERAL BUILDING DATA

LIGHTING SCHEDULE

Page ___of___

AREA: (A) MAIN____________SF (B) MEZZ____________SF
(A) ________X________ (B) ________X________

DATA SOURCE: ___DRAWINGS ___SURVEY TOUR

Mark	#lamps	W/Fix	#Fix	Flr #	Comments
	62	76	31		2356 watts (2 lamp fluorescent)
	146	48	73		3,504 watts (1 lamp fluorescent)
				Total	5860 watts
					Approximately 80% of the
					lights are out at
					all times
					Total watts used = (0.2)(5860w)
					= 1,172 watts

EST. 0.64 W/SF X (21,450 SF * 0.75 occupancy) = 10,296 W

10,296 W ÷ 1000 W/KW = 10.296 KW ÷ 0.00343 BTUH/KW

= 3016.7 or ~ 3020 BTUH TOT. at 0.44 schedule factor

(A) TOTAL: 1,172 Watts/ 21,450 SF= 0.055 W/SF

(B) TOTAL: ________Watts/ ________SF=________ W/SF

ADDITIONAL NOTES:

Bldg No.: S-6230

*** FMEA SURVEY OBSERVATIONS ***

GENERAL BUILDING DATA

MISCELLANEOUS BASE LOADS:

DOMESTIC HOT WATER:

MANUFACTURER & MODEL ______________________________

FUEL SOURCE ___ NAT GAS ___ ELEC ___ OIL ___ STM GEN ___ OTHER*

SUPPLY TEMPERATURE _____ °F, DISTANCE FROM HEATER _____ FT

INPUT ______ RECOVERY RATE _______ OPERATING SCHEDULE __________

EXTERIOR LIGHTING:

TYPE ______________ NO ___ SCHEDULE ___________ CONTROL _________

TYPE ______________ NO ___ SCHEDULE ___________ CONTROL _________

TOTAL KW __________

FUNCTION OF LIGHTS ___ SECURITY ___ PARKING LOT ___ ENTRY ___ OTHER*

ADDITIONAL COMMENTS: DHW from Steam Heating Plant. DHW is 100°F at taps, Storage tank temp is 105°F.

Note: The wood windows in this building are leaky but are quite a bit tighter than most of the temporary building's windows (made of wood).

Misc. Internal Gains: ~ 300 BTUH at 0.44 schedule factor.

FILM #: ______ FRAME #: ______________________________

ADDITIONAL SKETCHES:

Note: the buildings steam radiators are operated by hand valves. We estimate that the space temperature is maintained at 76°F during the winter months. There is not a central thermostat for the building.

*Specify in "Additional Comments"

Bldg No.: 5-6230

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

UNITARY HEATING EQUIPMENT:

UNIT NO.	TYPE	OUTPUT CAPACITY	HEATING SOURCE	CFM	HP	STARTER & CONTROL	SETPOINT

There are 118 hand operated steam radiators in the building, the majority are located directly beneath existing windows. Total Capacity:

$$q = (118 \text{ radiators})(50 \text{ sq ft/radiator})(240 \text{ BTU/SF})$$
$$= 1,416,000 \text{ BTU/hr.}$$

FILM #: _______ FRAME #: _______

NOTES: TYPE --> unit heater, unit ventilator, duct furnace, wall furnace, etc.
HEATING SOURCE --> electric, gas fired, oil, steam, hot water, etc.
STARTER & CONTROL --> momentary, maintained, line v stat, 24 v stat, self contained, etc.

Bldg No.: S-6230

**** FMEA SIMILAR BUILDINGS SURVEY FORM ****

10/92
AJN

GENERAL BUILDING DATA

BLDG #: 6231 (S) BLDG NAME: ~~HOSP. CLINIC~~ DATE: ~~2-13-85~~ JOB #: 124
SURVEYED BY: AM/WW BLDG CONTACT: DR. CASTLE TELEPHONE EXT: 4460
BLDG USE: ~~HOSP. CLINIC~~ # FLOORS: 2 # PEOPLE: 12 BLDG AREA: 20075 SF

BLDG OCCUPANCY: S M T W Th F S 0730 TO 1640 ? Entire Bldg. is Vacant
S M T W Th F S ______ TO ______

T'STAT SETTING: HTG: 78 / — AUTO SETBACK: N / Y: ___ / ___
CLG: — / —
Temperature, Future, inside, Occupied: 70/78 Temp Present: ____
Temperature, Future, inside, Unoccupied: 55/- AirChange/hR: .57

ARCHITECTURAL

	AREA	U-value	UA
WALL	10,252	.229	2,348
GLASS	1,965	1.176	2,311
ROOF	9320	.074	690
FLOOR	9320	.41	3821
SUM	30,857	—	9,170

Avg. Floor-Ceiling Height: 9.8' Floor type: C.S. Insulated: Y/N
Window frame type: Alum Wood Operable sections: Y / N
Window size: See Below SP DP CURT Infiltration L M H
Entry doors: 4 # OH Doors: Ø % of Area Conditioned: ____

LIGHTING: Type: FLUORESCENT Watts/SF: .44 Util Frac: ____

ELECTRICAL EQUIP: OFFICE KW/Unit: ____ #Units: ____ Util Frac: ____

DHW: TYPE: NG/ELEC/CONV Supply Temp: ____ GAL/Person-Day: ____
AFUE: ____ %

MECHANICAL

		HEATING	COOLING
	Primary System:	HTHW → STM Conv.	NONE
	Fuel:	NaG (CP)	
	Capacity:		
	est.Peak Del.Effic:	68.86 %	
	Months ON:	8	
	Hours ON:	5808	
AHUs	Hp:	—	
	cfm:	—	
	Min OA:	—	
	Economizer:	—	

MISC:
WINDOWS: 76 - 40" x 62"; 30 - 31" x 62";
22 - 31" x 54"
Double pane Windows. - Alum.
Radiators appear to have manual control valves (1ST FLR South wing - all manual)

PAGE 1 of 1

**** FMEA SIMILAR BUILDINGS SURVEY FORM ****

Contact: Millie Wheeler #1990

GENERAL BUILDING DATA

10/92 AJN

BLDG #: 6234 (S) BLDG NAME: ~~HOSP. CLINIC~~ DATE: ~~2-13-85~~ JOB #: 124

SURVEYED BY: WW/AM BLDG CONTACT: ______ TELEPHONE EXT: ______

BLDG USE: ~~HOSP. WARD~~ Simulation Center # FLOORS: 2 # PEOPLE: 14 BLDG AREA: 20143 SF

BLDG OCCUPANCY: S M T W Th F S ~~0730~~ 0700 TO ~~1640~~ 1630 30-50-150 Varies. 2wks/mo.

S M T W Th F S ______ TO ______ (~60 people avg.)

T'STAT SETTING: HTG: 78 / ___ AUTO SETBACK: N / Y: ___ / ___

CLG: — / —

Temperature,Future,inside,Occupied: 70/78 Temp Present: 72

Temperature,Future,inside,Unoccupied: 55/- AirChange/hR: .57

ARCHITECTURAL

	AREA	U-value	UA
WALL	9,826	.229	2,250
GLASS	2,391	1.176	2,812
ROOF	9320	.074	690
FLOOR	9320	.41	3821
SUM	30,857	—	9,573

Avg. Floor-Ceiling Height: 9.8' Floor type: C.S. Insulated: Y/N

Window frame type: Alum Wood Operable sections: Y / N

Window size: See Below SP DP CURT Infiltration L M H

\# Entry doors: 4 # OH Doors: Ø % of Area Conditioned: 100%

LIGHTING: Type: FLUORESCENT Watts/SF: .43 Util Frac: ____

ELECTRICAL EQUIP: OFFICE KW/Unit: ____ #Units: ___ Util Frac: ____

DHW: TYPE: NG/ELEC/CONV Supply Temp: _____ GAL/Person-Day: ____

AFUE: ______ %

MECHANICAL

		HEATING	COOLING
	Primary System:	HTHW + STM Conv.	NONE
	Fuel:	NAG (CP)	
	Capacity:		
	est.Peak Del.Effic:	68.86 %	
	Months ON:	8	
	Hours ON:	5808	
AHUs	Hp:	—	
	cfm:	—	
	Min OA:	—	
	Economizer:	—	

MISC:

WINDOWS: 15 - 31" x 54"; 107 - 40" x 62"; 28 - 31" x 62"

Double pane windows - Alum. Vert. sliders. caulked.

Computer simulation exercises / training center.

Just finished renovation in June. All radiators controlled by Honeywell C.V.s.

**** FMEA SIMILAR BUILDINGS SURVEY FORM ****

GENERAL BUILDING DATA

BLDG #: 6235 (S) BLDG NAME: HOSP. CLINIC DATE: 2-15-85 JOB #: 124
SURVEYED BY: AM/WW BLDG CONTACT: ______ TELEPHONE EXT: ______
BLDG USE: HOSP. CLINIC # FLOORS: 2 # PEOPLE: 18 BLDG AREA: 20075 SF

BLDG OCCUPANCY: S M T W Th F S 0730 TO 1640 — 1st FLR south wing only. Orthopedic Brace shop. rest of bldg locked up.
S M T W Th F S ______ TO ______

T'STAT SETTING: HTG: 76 / — AUTO SETBACK: N / Y: ___/___ 4 people in Brace Shop.
CLG: — / —
Temperature,Future,inside,Occupied: 70/78 Temp Present: 72
Temperature,Future,inside,Unoccupied: 55/- AirChange/hR: .57

ARCHITECTURAL

	AREA	U-value	UA
WALL	9,851	.229	2,256
GLASS	2,366	1.176	2782
ROOF	9320	.074	690
FLOOR	9320	.41	3821
SUM	30,857	—	9,549

Avg. Floor-Ceiling Height: 9.8' Floor type: C.S. Insulated: Y/N
Window frame type: Alum Wood Operable sections: Y / N
Window size: See Below SP DP CURT Infiltration L M H
Entry doors: 5 # OH Doors: 0 % of Area Conditioned: 100%

LIGHTING: Type: Fluorescent Watts/SF: .43 Util Frac: ____

ELECTRICAL EQUIP: KW/Unit: ____ #Units: ____ Util Frac: ____

DHW: TYPE: NG/ELEC/CONV Supply Temp: ____ GAL/Person-Day: ____
AFUE: ____ %

MECHANICAL

	HEATING	COOLING
Primary System:	CENTRAL PLANT	NONE
Fuel:	NAG (CP)	
Capacity:		
est.Peak Del.Effic:	68.86 %	
Months ON:	8	
Hours ON:	5808	
AHUs Hp:	—	
cfm:		
Min OA:	—	
Economizer:	—	

MISC:

WINDOWS: 20 - 31" x 54"; 96 - 40" x 62";
36 - 31" x 62"
Manual radiator control valves
Double pane - Alum. Vertical sliders caulked - Windows

PAGE 1 of 1

**** FMEA SIMILAR BUILDINGS SURVEY FORM ****

GENERAL BUILDING DATA

BLDG #: 6240 (S) BLDG NAME: ~~HOSP CLINIC~~ DATE: 2-15-85 JOB #: 124
SURVEYED BY: AW/WW BLDG CONTACT: ______ TELEPHONE EXT: ______
BLDG USE: ~~HOSP. WARD~~ # FLOORS: 2 # PEOPLE: 16 BLDG AREA: 19969 SF

BLDG OCCUPANCY: S M T W Th F S 0730 TO 1640
S M T W Th F S ______ TO ______

T'STAT SETTING: HTG: 78 / — AUTO SETBACK: N / Y: — / —
CLG: — / —
Temperature,Future,inside,Occupied: 70/78 Temp Present: 74
Temperature,Future,inside,Unoccupied: 55/- AirChange/hR: .57

ARCHITECTURAL

	AREA	U-value	UA
WALL	9,851	.229	2,256
GLASS	2,366	1.176	2,782
ROOF	9320	.074	690
FLOOR	9320	.41	3821
SUM	30,857	—	9,549

Dbl. pane Alum. Vert. Sliders

Avg. Floor-Ceiling Height: 9.8' Floor type: C.S. Insulated: Y/N
Window frame type: Alum ~~Wood~~ Operable sections: Y / N
Window size: See Below SP DP CURT Infiltration L M H
Entry doors: 6 # OH Doors: Ø % of Area Conditioned: ______

LIGHTING: Type: Fluorescent Watts/SF: .43 Util Frac: ______

ELECTRICAL EQUIP: KW/Unit: ____ #Units: ____ Util Frac: ______

DHW: TYPE: NG/ELEC/CONV Supply Temp: ______ GAL/Person-Day: ______
AFUE: ______ %

MECHANICAL

	HEATING	COOLING
Primary System:	CENTRAL PLANT	NONE
Fuel:	NAG (CP)	
Capacity:		
est.Peak Del.Effic:	68.86 %	
Months ON:	8	
Hours ON:	5808	
AHUs Hp:	—	
cfm:	—	
Min OA:	—	
Economizer:	—	

MISC:

WINDOWS: 96 – 40"x62"; 20 – 31"x54"; 36-31"x62"
1st Floor No. Wing. USAISC Information Center (7:30 – 4:30)
& 2nd Manual control valves entire bldg. Now manual control values in Info Center
So. Wing 1st & 2nd FLR – old manual control valves
No insul. on stm piping between Floors – affects control of heating.

PAGE 1 of 1

**** FMEA SIMILAR BUILDINGS SURVEY FORM ****

10/92
AJN

GENERAL BUILDING DATA

BLDG #: 6241 (S) BLDG NAME: HOSP. CLINIC DATE: ~~2-15-85~~ JOB #: 124
SURVEYED BY: AM/WW BLDG CONTACT: ______ TELEPHONE EXT: ______
BLDG USE: HOSP. CLINIC # FLOORS: 2 # PEOPLE: 11 BLDG AREA: 20075 SF

BLDG OCCUPANCY: S M T W Th F S 0730 TO 1630
S M T W Th F S ______ TO ______

T'STAT SETTING: HTG: 74 / ___ AUTO SETBACK: N / Y: ___ / ___
CLG: ___ / ___
Temperature,Future,inside,Occupied: 70/ Temp Present: 74
Temperature,Future,inside,Unoccupied: 55/- AirChange/hR: .57

ARCHITECTURAL

	AREA	U-value	UA
WALL	9,851	.229	2,256
GLASS	2,366	1.176	2,782
ROOF	9320	.074	690
FLOOR	9320	.41	[illegible]
SUM	30,857	—	9,549

Avg. Floor-Ceiling Height: 9.8' Floor type: C.S. Insulated: Y/N
Window frame type: Alum Wood Operable sections: Y / N
Window size: See Below SP DP CURT Infiltration L M H
Entry doors: 5 # OH Doors: Ø % of Area Conditioned: 100

LIGHTING: Type: FLUORESCENT Watts/SF: .43 Util Frac: ____

ELECTRICAL EQUIP: OFFICE KW/Unit: ____ #Units: ____ Util Frac: ____

DHW: TYPE: NG/ELEC/CONV Supply Temp: ______ GAL/Person-Day: ____
AFUE: ______ %

MECHANICAL

		HEATING	COOLING
	Primary System:	CENTRAL PLANT	NONE
	Fuel:	NaG	
	Capacity:		
	est.Peak Del.Effic:	68.56 %	
	Months ON:	8	
	Hours ON:	5808	
AHUs	Hp:	—	
	cfm:	—	
	Min OA:	—	
	Economizer:	—	

MISC:
WINDOWS: 96 - 40" x 62"; 20 - 31" x 54"; 36 - 31" x 62"
New Windows.
Manual control valves Thru out bldg.

**** FMEA SIMILAR BUILDINGS SURVEY FORM ****

10/92 ATN

GENERAL BUILDING DATA

BLDG #: 6244 (S) BLDG NAME: ~~HOSP. CLINIC~~ DATE: ~~2-13-85~~ JOB #: 124
SURVEYED BY: AM/WW BLDG CONTACT: ______ TELEPHONE EXT: ______
BLDG USE: ~~HOSP. CLINIC~~ # FLOORS: 2 # PEOPLE: 14 BLDG AREA: 21406 SF

BLDG OCCUPANCY: S M T W Th F S 0730 TO 1640
S M T W Th F S ______ TO ______

T'STAT SETTING: HTG: 74 / — AUTO SETBACK: N / Y: — / —
CLG: — / —
Temperature,Future,inside,Occupied: 70/78 Temp Present: 74
Temperature,Future,inside,Unoccupied: 55/- AirChange/hR: .57

ARCHITECTURAL

	AREA	U-value	UA
WALL	9,885	.229	2,264
GLASS	2,332	1.176	2,742
ROOF	9320	.074	690
FLOOR	9320	.41	3821
SUM	30,857	—	9,517

Avg. Floor-Ceiling Height: 9.8' Floor type: C.S. Insulated: Y/N
Window frame type: Alum Wood Operable sections: Y / N
Window size: See Below SP DP CURT Infiltration L M H
Entry doors: 6 # OH Doors: ∅ % of Area Conditioned: 100

LIGHTING: Type: FLUORESCENT Watts/SF: .43 Util Frac: ______

ELECTRICAL EQUIP: OFFICE KW/Unit: ______ #Units: ______ Util Frac: ______

DHW: TYPE: NG/ELEC/CONV Supply Temp: ______ GAL/Person-Day: ______
AFUE: ______ %

MECHANICAL

		HEATING	COOLING
Primary System:		CENTRAL PLANT	NONE
Fuel:		NG	
Capacity:			
est.Peak Del.Effic:		68.56 %	
Months ON:		8	
Hours ON:		5808	
AHUs	Hp:		
	cfm:		
	Min OA:		
	Economizer:		

MISC:

WINDOWS: 95 - 40"x62"; 33 - 31"x62"; 22 - 31"x54"
New windows - double pane Alum.
Red Cross on 1ST FLR } Locked up.
Temp. Barracks 2nd FLR }

PAGE 1 of 1

**** FMEA SIMILAR BUILDINGS SURVEY FORM ****

10/92 AJN

GENERAL BUILDING DATA

Entire Bldg is Vacant.

BLDG #: 6252 (S) BLDG NAME: ~~HOSP. CLINIC~~ DATE: ~~2-15-88~~ JOB #: 124
SURVEYED BY: ~~AM/WW~~ BLDG CONTACT: ______ TELEPHONE EXT: ______
BLDG USE: ~~HOSP. WARD~~ # FLOORS: 2 # PEOPLE: ___ BLDG AREA: 21381 SF

BLDG OCCUPANCY: S M T W Th F S 0730 TO 1640
S M T W Th F S ______ TO ______

T'STAT SETTING: HTG: 74 / — AUTO SETBACK: N / Y: __ / __
CLG: — / —
Temperature,Future,inside,Occupied: 70/78 Temp Present: 74
Temperature,Future,inside,Unoccupied: 55/- AirChange/hR: .57

ARCHITECTURAL

	AREA	U-value	UA
WALL	9,851	.229	2,256
GLASS	2,366	1.176	2,782
ROOF	9320	.074	690
FLOOR	9320	.41	3821
SUM	30,857	—	9,549

Avg. Floor-Ceiling Height: 9.8' Floor type: C.S. Insulated: Y/N
Window frame type: Alum Wood Operable sections: Y / N
Window size: See Below SP DP CURT Infiltration L M H
Entry doors: 6 # OH Doors: Ø % of Area Conditioned: ____

LIGHTING: Type: FLUORESCENT Watts/SF: .43 Util Frac: ____

ELECTRICAL EQUIP: OFFICE KW/Unit: ____ #Units: ____ Util Frac: ____

DHW: TYPE: NG/ELEC/CONV Supply Temp: ____ GAL/Person-Day: ____
AFUE: ____ %

MECHANICAL

		HEATING	COOLING
	Primary System:	HTHW → STM CONV	NONE
	Fuel:	NAG (CP)	
	Capacity:		
	est.Peak Del.Effic:	68.86 %	
	Months ON:	8	
	Hours ON:	5808	
AHUs	Hp:	—	
	cfm:	—	
	Min OA:	—	
	Economizer:	—	

MISC:

WINDOWS: 20 - 31" x 54"; 96 - 40" x 62";
36 - 31" x 62"
New Windows
Bldg is locked up, — appears that radiators are controlled by manual Valves.

**** FMEA SIMILAR BUILDINGS SURVEY FORM ****

10/92 AJN

GENERAL BUILDING DATA

Bldg is Vacant.

BLDG #: 6253 (S) BLDG NAME: ~~HOSP. CLINIC~~ DATE: ~~2-15-85~~ JOB #: 124
SURVEYED BY: ~~AAA/WW~~ BLDG CONTACT: Beverly Herath TELEPHONE EXT: 5137/5138
BLDG USE: HOSP. WARD # FLOORS: 2 # PEOPLE: ___ BLDG AREA: 25283 SF

BLDG OCCUPANCY: S [M T W Th F] S 0730 TO 1640
S M T W Th F S ___ TO ___

T'STAT SETTING: HTG: 74 / — AUTO SETBACK: N / Y: ___ / ___
CLG: — / —
Temperature,Future,inside,Occupied: 70/78 Temp Present: 74
Temperature,Future,inside,Unoccupied: 55/- AirChange/hR: .57

ARCHITECTURAL

	AREA	U-value	UA
WALL	9,851	.229	2,256
GLASS	2,366	1.176	2,782
ROOF	9320	.074	690
FLOOR	9320	.41	3821
SUM	30,857	—	9,549

Avg. Floor-Ceiling Height: 9.8' Floor type: C.S. Insulated: Y/N
Window frame type: Alum Wood Operable sections: Y / N
Window size: See Below ~~SP~~ DP CURT Infiltration L M H
Entry doors: 5 # OH Doors: Ø % of Area Conditioned: ___

LIGHTING: Type: FLUORESCENT Watts/SF: .43 Util Frac: ___

ELECTRICAL EQUIP: OFFICE KW/Unit: ___ #Units: ___ Util Frac: ___

DHW: TYPE: NG/ELEC/CONV Supply Temp: ___ GAL/Person-Day: ___
AFUE: ___ %

MECHANICAL

		HEATING	COOLING
	Primary System:	HTHW → STM ~~CONV~~	NONE
	Fuel:	NAG (CP)	
	Capacity:		
	est.Peak Del.Effic:	68.86 %	
	Months ON:	8	
	Hours ON:	5808	
AHUs	Hp:	—	
	cfm:	—	
	Min OA:	—	
	Economizer:	—	

MISC:

WINDOWS: 20 - 31"x 54"; 96" — 40"x62";
36 — 31"x 62"
New Windows - Double Pane
No Radiators, 2 AHUs serve bldg - one for ea wing (N/S)
All windows open on 1ST FLR Northwing while heating is ON.

****** FMEA SIMILAR BUILDINGS SURVEY FORM ******

10/92 AJN

GENERAL BUILDING DATA

BLDG #: 6254 (S) BLDG NAME: ~~HOSP. CLINIC~~ DATE: ~~2-15-85~~ JOB #: 124
SURVEYED BY: ~~AM/WW~~ BLDG CONTACT: TELEPHONE EXT:
BLDG USE: ~~HOSP. CLINIC~~ # FLOORS: 2 # PEOPLE: 14 BLDG AREA: 20075 SF

BLDG OCCUPANCY: S $\boxed{\text{M T W Th F}}$ S 0730 TO 1640
S M T W Th F S ____ TO ____

T'STAT SETTING: HTG: 74 / — AUTO SETBACK: N / Y: __ / __
CLG: — / —
Temperature, Future, inside, Occupied: 70/78 Temp Present: 74
Temperature, Future, inside, Unoccupied: 55/- AirChange/hR: .57

ARCHITECTURAL

	AREA	U-value	UA
WALL	9,851	.229	2,256
GLASS	2,366	1.176	2,782
ROOF	9320	.074	690
FLOOR	9320	.41	3821
SUM	30,857	—	9,549

Avg. Floor-Ceiling Height: 9.8' Floor type: C.S. Insulated: Y/N
Window frame type: Alum Wood Operable sections: Y / N
Window size: See Below SP DP CURT Infiltration L M H
Entry doors: 5 # OH Doors: Ø % of Area Conditioned:

LIGHTING: Type: FLUORESCENT Watts/SF: .43 Util Frac:

ELECTRICAL EQUIP: OFFICE KW/Unit: #Units: Util Frac:

DHW: TYPE: NG/ELEC/CONV Supply Temp: GAL/Person-Day:
AFUE: %

MECHANICAL

	HEATING	COOLING
Primary System:	HTHW → STM Conv	NONE
Fuel:	NG (CP)	
Capacity:		
est. Peak Del. Effic:	68.86 %	
Months ON:	8	
Hours ON:	5808	
AHUs Hp:		
cfm:		
Min OA:		
Economizer:		

MISC:

WINDOWS: 20 - 31" x 54"; 96 - 40" x 62";
36 - 31" x 62"
New Windows 2-AHUs heat bldg, No Radiators
1st FLR N is Utility Shop - open M-F 0630 to 1500 N 4 people.
Rest of Bldg is used as storage (Vacant)

**** FMEA SIMILAR BUILDINGS SURVEY FORM ****

10/92 ADN

NERAL BUILDING DATA

BLDG #: 6255 (S) BLDG NAME: ~~HOSP CLINIC~~ DATE: ~~2-15-85~~ JOB #: 124
SURVEYED BY: ~~AW/WW~~ BLDG CONTACT: ______ TELEPHONE EXT: ____
BLDG USE: ~~HOSP CLINIC~~ # FLOORS: 2 # PEOPLE: ___ BLDG AREA: 25078 SF

BLDG OCCUPANCY: S [M T W Th F] S 0730 TO 1640
S M T W Th F S ______ TO ______

T'STAT SETTING: HTG: 74 / ___ AUTO SETBACK: N / Y: ___ / ___
CLG: ___ / ___
Temperature,Future,inside,Occupied: 70/78 Temp Present: 74
Temperature,Future,inside,Unoccupied: 55/- AirChange/hR: .57

ARCHITECTURAL

	AREA	U-value	UA
WALL	9,851	.229	2,256
GLASS	2,366	1.176	2,782
ROOF	9320	.074	690
FLOOR	9320	.41	3821
SUM	30,857	—	9,549

Avg. Floor-Ceiling Height: 9.8' Floor type: C.S. Insulated: Y/N
Window frame type: Alum Wood Operable sections: Y / N
Window size: See Below SP DP CURT Infiltration L M H
Entry doors: 6 # OH Doors: 0 % of Area Conditioned: ____

LIGHTING: Type: FLUORESCENT Watts/SF: .43 Util Frac: ____

ELECTRICAL EQUIP: OFFICE KW/Unit: ____ #Units: ____ Util Frac: ____

DHW: TYPE: NG/ELEC/CONV Supply Temp: ____ GAL/Person-Day: ____
AFUE: ____ %

MECHANICAL

	HEATING	COOLING
Primary System:	HTHW → STM CONV	NONE
Fuel:	NG (CP)	
Capacity:		
est.Peak Del.Effic:	68.86 %	
Months ON:	8	
Hours ON:	5808	
AHUs Hp:	—	
cfm:	—	
Min OA:		
Economizer:		

MISC:

WINDOWS: 20 - 31" x 54"; 96 - 40" x 62";
36 - 31" x 62" Now Windows - double pane
2nd FLR & 1st FLR N are Vacant; 1st FLR South is Occupational Health
AHU provides Air Cond. ~~to~~ ~~[illegible]~~ Occupational Health & Bldg heated by radiators.
all have Manual Control Valves.
8 STAFF & ~ 8-10 clients per day. 7:30 to 1630

PAGE 1 of 1

*** FMEA SURVEY OBSERVATIONS ***

3/19/93 GM

GENERAL BUILDING DATA ZONE 1

#: 8000 BLDG NAME: CONS FIELD MTCE SHOP JOB #: 124
EYED BY: TEAM 1 DATE: ~~10/15/89~~ BLDG CONTACT: AL JOHNS
CONTACT TELEPHONE NUMBER: 4119/3548 BLDG USAGE: REPAIR FACILITY
TOT BLDG AREA: 96895 SF # OF FLOORS: 1 # OF PEOPLE: 110

BUILDING OCCUPANCY:

MON - FRI:	0700	TO	1600	FIRST SHIFT:	_____
SATURDAY:	0700	TO	1200	SECND SHIFT:	_____
SUNDAY:	____	TO	____	THIRD SHIFT:	_____
HOLIDAYS:	____	TO	____	HOLIDAYS:	_____

ENVIRONMENTAL CONDITIONS:

	HEATING SETPOINTS				COOLING SETPOINTS			
	WEEKDAYS		WEEKENDS		WEEKDAYS		WEEKENDS	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
PRESENT T'STAT:	65°F	UNITS ON @ 3AM / OFF @ 3:30 PM					_____	_____
REQUIRED T'STAT:	55°F	_____	_____	_____	_____	_____	_____	_____

THERMOSTAT LOCATION(S): ____________
HUMIDIFICATION REQUIREMENTS (RH): ____ H'STAT LOCATION(S): ________

LIGHTING:

	AREA (SF)	LAMP TYPE	#LMPS	W/SF	SCHEDULE ON	OFF
1)	96,895	FL/MV (139,780W)	1296	1.44	0700	1600
2)						
3)						
4)						

SOURCE: ✓ OBSERVATION ___ ASHRAE ___ OTHER
ATTACHED SCHEDULE? ✓ Y ___ N

ELECTRIC EQUIPMENT:

	AREA (SF)	TYPE	(KW)	W/SF	SCHEDULE ON	OFF
1)	96,895	ASSEMBLY	426	4.4	0700	1600
2)						
3)						
4)						

DATA SOURCE: ✓ OBSERVATION ___ ASHRAE ___ OTHER
SEE ATTACHED SCHEDULE? ___ Y ✓ N

INTERNAL MASS: MATERIAL: ______________ ESTIMATED MASS: _ (L, M, H)

INFILTRATION: LOCATION(S): OVERHEAD DOORS - ~ 75 OPENINGS/DAY @ 1 MIN DURATION

ESTIMATED RATE: _____ (L, M, H) or
3.4 AIR CHANGES or
_____ CFM/LIN FT CRACK

* 100% RA UNIT
** 100% OA UNIT

*** FMEA SURVEY OBSERVATIONS ***

GENERAL BUILDING DATA

CONSTRUCTION:

WALLS:

	CONSTRUCTION COMPONENT	WIDTH	HEIGHT	GROSS AREA(SF)	U-VALUE
N:	INS MTL PNL / CMU	327'-0"	40'-5'	13,225	0.23
S:	WAINSCOT/OH DOORS	327'-0"	38'-0"	12,425	0.25
E:	8" CONC. FIREWALL	296'-0"	8'-0"	2,368	0.19
W:	INS MTL PNL / CMU	296-0	37'-10"	11,218	0.21

ROOFS:

CONSTRUCTION COMPONENT	WIDTH	HEIGHT	AREA(SF)	U-VALUE
MTL DECK/2" RIG. INS/B.U.R.	296'-0"	327'-0"	96,792	0.10

WINDOWS:

	AREA(SF)	TYPE	SF	DP	DRAPES
N:	1490	ARCH. PROJ./FIXED	✓	✓	N
S:	2290	ARCH. PROJ./FIXED	✓	✓	N
E:	—	—	—	—	—
W:	158	FIXED	✓		N

FLOOR TYPE: ✓ SLAB ___ CRAWL SPACE ___ BASEMENT ___ OTHER*

AREA: 96,792 SF

PERIMETER: 950 LF INSULATION? ✓ Y ___ N 2 IN RIGID TO 24"

SPECIAL AREAS: ______

ADDITIONAL NOTES: ______

FILM #: ______ FRAME #: ______

SKETCHES:

*Specify in "Additional Notes"

Bldg No.: 8000 ZONE 1

GENERAL BUILDING DATA

MISCELLANEOUS BASE LOADS:
DOMESTIC HOT WATER:
MANUFACTURER & MODEL NONE
FUEL SOURCE ___ NAT GAS ___ ELEC ___ OIL ___ STM GEN ___ OTHER*
SUPPLY TEMPERATURE _____ °F, DISTANCE FROM HEATER _____ FT
INPUT ______ RECOVERY RATE _______ OPERATING SCHEDULE ___________

EXTERIOR LIGHTING:
TYPE MV NO 22 SCHEDULE ___________ CONTROL PHOTOCELL
TYPE _____________ NO ___ SCHEDULE ___________ CONTROL _________
TOTAL KW 10.1
FUNCTION OF LIGHTS ✓ SECURITY ___ PARKING LOT ___ ENTRY
___ OTHER*

ADDITIONAL COMMENTS: ONLY 30% OF OUTSIDE LIGHTS ARE ALLOWED TO BE ON AT ANY TIME (DURING THE NIGHT)

FILM #: ______ FRAME #: ______________________________

ADDITIONAL SKETCHES:

* Specify in "Additional Comments"

*** FMEA SURVEY OBSERVATIONS ***

GENERAL BUILDING DATA

LIGHTING SCHEDULE

Page ___ of ___

AREA: (A) MAIN 96895 SF (B) MEZZ ____________ SF

(A) ________ X ________ (B) ________ X ________

DATA SOURCE: ✓ DRAWINGS ✓ SURVEY TOUR

Mark	#lamps	W/Fix	#Fix	Flr #	Comments
F	2	215	408	A	
	2	75	13	A	
	3	112.5	6	A	
	4	150	101	A	
	2	12	5	A	EXIT LIGHTS
MV	1	400	22	A	EXTERIOR
	1	1100	22	A	HI-BAY
T	1	100	22	A	UTILITY TUNNEL

(A) TOTAL: 139,780 Watts/ 96,895 SF= 1.443 W/SF

(B) TOTAL: ______________ Watts/ ______________ SF= ________ W/SF

ADDITIONAL NOTES:

Bldg No.: 8000 ZONE 1

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

AIR HANDLING UNITS:
MANUFACTURER HASTINGS MODEL No. MU 1200 FR
AHU NUMBER: RTV-1 AHU TYPE: ROOF MTD MUA, VENTED
LOCATION: AREA 1 ROOF SPACE SERVED: RM 1-22

FAN DATA:
SUPPLY FAN HP: 7.5 SUPPLY CFM: 12K STATIC PRESS: 1.25
RETURN FAN HP: — RETURN CFM: — STATIC PRESS: —
EXHAUST FAN HP: — EXHAUST CFM: — STATIC PRESS: —
MOTOR STARTER: MNT __ MOM __. SWITCH: P.B. __ H.O.A. ✓ DISCON __

COILS:
HEATING: HW __ STM __ DIRECT FIRED --> NG ✓ 672 KBTUH OIL __ ELC__ OTHER __
NO COOLING: CW — DX —. FROM CHILLER —, FROM DX UNIT —
NO REHEAT: # OF COILS ___ TYPE _____. RECOOL: # OF COILS ___ TYPE ____
NO HUMIDITY: STM __ SPRAY __ ELC __. HW/CW COIL VALVES: 2 WAY __, 3 WAY __

DAMPERS:
O.A. DAMPER: Y (Y, N), IF YES, FIXED __%, MODULATING 0% TO 100%
R.A. DAMPER: N (Y, N), IF YES, FIXED __%, MODULATING __% TO __%
E.A. DAMPER: N (Y, N), IF YES, FIXED __%, MODULATING __% TO __%
ECONOMIZER: N (Y, N), IF YES, OA __ RA __ ENTHALPY __
OA LEAKAGE: 30 % IF NO, CAN ECONOMIZER BE ADDED N

FILTER CONDITION: ___GOOD ___FAIR ___POOR NONE

SYSTEM OPERATION:

	MON - FRI	SAT	SUN
*PRESENT OPERATION:	0300 TO 1530	_____ TO _____	_____ TO _____
*REQUIRED OPERATION:	_____ TO _____	_____ TO _____	_____ TO _____

	HEATING SETPOINTS WEEKDAYS DAY	NIGHT	WEEKENDS DAY	NIGHT	COOLING SETPOINTS WEEKDAYS DAY	NIGHT	WEEKENDS DAY	NIGHT
*PRESENT TEMP:	65°	OFF						
*REQUIRED TMP:								

HUMIDIFICATION REQUIREMENTS (RH): ____ HUMIDISTAT LOCATION: _____

SYSTEM SETPOINTS: MIXED AIR ___°F, HOT DECK ___°F, COLD DECK ___°F
TIME CLOCK: Y (Y, N), IF YES, IS IT OPERATIONAL Y (Y, N)

CONTROLS: PNEUMATIC ______, ELECTRIC ✓, PNEUMATIC/ELEC ______

EQUIPMENT CONDITION: EXCELLENT(E), GOOD(G), POOR(P) T'STAT G
H'STAT — COMPR — DAMPERS P LINKAGES G FANS G SHEAVES G
VALVES E ACTUATORS G BELTS G MIXING BOX G
OTHER___

COMMENTS: ______________________________

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA ✓

AIR HANDLING UNITS:
MANUFACTURER HASTINGS MODEL No. LB16B
AHU NUMBER: RT1A-F AHU TYPE: MUA, 100% O.A.
LOCATION: ______ SPACE SERVED: ______

FAN DATA:
SUPPLY FAN HP: 10 SUPPLY CFM: 15K STATIC PRESS: 1.25
RETURN FAN HP: — RETURN CFM: — STATIC PRESS: —
EXHAUST FAN HP: — EXHAUST CFM: — STATIC PRESS: —
MOTOR STARTER: MNT __ MOM __. SWITCH: P.B. __ H.O.A. ✓ DISCON __

COILS:
HEATING: HW __ STM __ DIRECT FIRED --> NG ✓ OIL __ ELC __ OTHER __
NO COOLING: CW __ DX __. FROM CHILLER ______, FROM DX UNIT ______
NO REHEAT: # OF COILS ___ TYPE _____. RECOOL: # OF COILS ___ TYPE ___
NO HUMIDITY: STM __ SPRAY __ ELC __. HW/CW COIL VALVES: 2 WAY __, 3 WAY __

DAMPERS:
O.A. DAMPER: Y (Y, N), IF YES, FIXED __%, MODULATING 0% TO 100%
R.A. DAMPER: N (Y, N), IF YES, FIXED __%, MODULATING __% TO __%
E.A. DAMPER: N (Y, N), IF YES, FIXED __%, MODULATING __% TO __%
ECONOMIZER: N (Y, N), IF YES, OA __ RA __ ENTHALPY __
OA LEAKAGE: 30 % IF NO, CAN ECONOMIZER BE ADDED N

FILTER CONDITION: ___GOOD ___FAIR ___POOR NONE

SYSTEM OPERATION:

	MON - FRI		SAT		SUN	
*PRESENT OPERATION:	___ TO	___	___ TO	___	___ TO	___
*REQUIRED OPERATION:	___ TO	___	___ TO	___	___ TO	___

	HEATING SETPOINTS				COOLING SETPOINTS			
	WEEKDAYS		WEEKENDS		WEEKDAYS		WEEKENDS	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
*PRESENT TEMP:								
*REQUIRED TMP:								

HUMIDIFICATION REQUIREMENTS (RH): ____ HUMIDISTAT LOCATION: ____

SYSTEM SETPOINTS: MIXED AIR ___°F, HOT DECK ___°F, COLD DECK ___°F
TIME CLOCK: Y (Y, N), IF YES, IS IT OPERATIONAL Y (Y, N)

CONTROLS: PNEUMATIC ______, ELECTRIC ✓, PNEUMATIC/ELEC ______

EQUIPMENT CONDITION: EXCELLENT(E), GOOD(G), POOR(P) T'STAT ___
H'STAT ___ COMPR ___ DAMPERS ___ LINKAGES ___ FANS ___ SHEAVES ___
VALVES ___ ACTUATORS ___ BELTS ___ MIXING BOX ___
OTHER___

A B C D E F

COMMENTS: THIS IS TYPICAL OF SIX (6) UNITS - RT1-A THRU F.
1 UNIT HAS BEEN CONVERTED TO 100% RA.

--> Disregard if the item is the same as the GENERAL BUILDING DATA.

Bldg No.: 8000 ZONE 1

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

AIR HANDLING UNITS:
MANUFACTURER HASTINGS ✓ MODEL No. LB-12-A
AHU NUMBER: RT-2 AHU TYPE: MUA 100% O.A.
LOCATION: ROOF SPACE SERVED: AREA 1

FAN DATA:
SUPPLY FAN HP: 7.5 SUPPLY CFM: 12K STATIC PRESS: 1.25
NO RETURN FAN HP: — RETURN CFM: — STATIC PRESS: —
NO EXHAUST FAN HP: — EXHAUST CFM: — STATIC PRESS: —
MOTOR STARTER: MNT __ MOM __. SWITCH: P.B. __ H.O.A. ✓ DISCON __

COILS:
HEATING: HW __ STM __ DIRECT FIRED --> NG ✓ OIL __ ELC __ OTHER __ 672 KBTUH
NO COOLING: CW __ DX __. FROM CHILLER ________, FROM DX UNIT ______
NO REHEAT: # OF COILS ___ TYPE _____. RECOOL: # OF COILS ___ TYPE ____
NO HUMIDITY: STM __ SPRAY __ ELC __. HW/CW COIL VALVES: 2 WAY __, 3 WAY __

DAMPERS:
O.A. DAMPER: Y (Y, N), IF YES, FIXED __%, MODULATING Ø% TO 100%
R.A. DAMPER: N (Y, N), IF YES, FIXED __%, MODULATING __% TO __%
E.A. DAMPER: N (Y, N), IF YES, FIXED __%, MODULATING __% TO __%
ECONOMIZER: N (Y, N), IF YES, OA __ RA __ ENTHALPY __
OA LEAKAGE: 30 % IF NO, CAN ECONOMIZER BE ADDED N

FILTER CONDITION: ___GOOD ___FAIR ___POOR NONE

SYSTEM OPERATION:	MON - FRI		SAT		SUN	
*PRESENT OPERATION:	______ TO	______	______ TO	______	______ TO	______
*REQUIRED OPERATION:	______ TO	______	______ TO	______	______ TO	______

	HEATING SETPOINTS				COOLING SETPOINTS			
	WEEKDAYS		WEEKENDS		WEEKDAYS		WEEKENDS	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
*PRESENT TEMP:								
*REQUIRED TMP:								

HUMIDIFICATION REQUIREMENTS (RH): ____ HUMIDISTAT LOCATION: _____

SYSTEM SETPOINTS: MIXED AIR ___°F, HOT DECK ___°F, COLD DECK ___°F
TIME CLOCK: Y (Y, N), IF YES, IS IT OPERATIONAL Y (Y, N)

CONTROLS: PNEUMATIC ______, ELECTRIC ______, PNEUMATIC/ELEC ______

EQUIPMENT CONDITION: EXCELLENT(E), GOOD(G), POOR(P) T'STAT G
H'STAT — COMPR — DAMPERS P LINKAGES G FANS G SHEAVES G
VALVES G ACTUATORS G BELTS G MIXING BOX G
OTHER___

COMMENTS: ____

--> Disregard if the item is the same as the GENERAL BUILDING DATA.

Bldg No.: 8000 ZONE 1

***** FMEA SURVEY OBSERVATIONS *****

MECHANICAL EQUIPMENT DATA

AIR HANDLING UNITS:
MANUFACTURER HASTINGS MODEL No. LB16B
AHU NUMBER: RT3A+C AHU TYPE: MUA, 100% OA
LOCATION: ROOF SPACE SERVED: AREAS 1&3

FAN DATA:
SUPPLY FAN HP: 10 SUPPLY CFM: 15K STATIC PRESS: 1.25
NO RETURN FAN HP: — RETURN CFM: — STATIC PRESS: —
NO EXHAUST FAN HP: — EXHAUST CFM: — STATIC PRESS: —
MOTOR STARTER: MNT __ MOM __. SWITCH: P.B. __ H.O.A. ✓ DISCON __

COILS:
HEATING: HW __ STM __ DIRECT FIRED --> NG ✓ OIL __ ELC__ OTHER __
NO COOLING: CW __ DX __. FROM CHILLER ________, FROM DX UNIT ______
NO REHEAT: # OF COILS ___ TYPE _____. RECOOL: # OF COILS ___ TYPE ____
NO HUMIDITY: STM __ SPRAY __ ELC __. HW/CW COIL VALVES: 2 WAY __, 3 WAY __

DAMPERS:
O.A. DAMPER: Y (Y, N), IF YES, FIXED __%, MODULATING 0% TO 100%
R.A. DAMPER: N (Y, N), IF YES, FIXED __%, MODULATING __% TO __%
E.A. DAMPER: N (Y, N), IF YES, FIXED __%, MODULATING __% TO __%
ECONOMIZER: N (Y, N), IF YES, OA __ RA __ ENTHALPY __
OA LEAKAGE: 30 % IF NO, CAN ECONOMIZER BE ADDED NO

FILTER CONDITION: ___GOOD ___FAIR ___POOR NONE

SYSTEM OPERATION:	MON - FRI			SAT			SUN		
*PRESENT OPERATION:	______	TO	_____	_____	TO	_____	_____	TO	_____
*REQUIRED OPERATION:	_____	TO	_____	_____	TO	_____	_____	TO	_____

	HEATING SETPOINTS				COOLING SETPOINTS			
	WEEKDAYS		WEEKENDS		WEEKDAYS		WEEKENDS	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
*PRESENT TEMP:	_____	_____	_____	_____	_____	_____	_____	_____
*REQUIRED TMP:	_____	_____	_____	_____	_____	_____	_____	_____

HUMIDIFICATION REQUIREMENTS (RH): ____ HUMIDISTAT LOCATION: _____

SYSTEM SETPOINTS: MIXED AIR ___°F, HOT DECK ___°F, COLD DECK ___°F
TIME CLOCK: Y (Y, N), IF YES, IS IT OPERATIONAL Y (Y, N)

CONTROLS: PNEUMATIC ______, ELECTRIC ✓, PNEUMATIC/ELEC ______

EQUIPMENT CONDITION: EXCELLENT(E), GOOD(G), POOR(P) T'STAT G
H'STAT — COMPR — DAMPERS P LINKAGES G FANS G SHEAVES G
VALVES G ACTUATORS G BELTS G MIXING BOX G
OTHER___

COMMENTS: THIS IS TYPICAL OF THREE (3) UNITS - RT3A THRU C. B

--> Disregard if the item is the same as the GENERAL BUILDING DATA.

Bldg No.: 8000 ZONE 1

__FMEA_SURVEY_OBSERVATIONS__

MECHANICAL_EQUIPMENT_DATA ✓

AIR HANDLING UNITS:
MANUFACTURER _HASTINGS_____________ MODEL No. LB 28A____________
AHU NUMBER: RT4A,B AHU TYPE: _MUA, 100% O.A.________________
LOCATION: _ROOF_______________ SPACE SERVED: _AREA 2__________

FAN DATA:
SUPPLY FAN HP: ~~15~~ 20HP SUPPLY CFM: 28K STATIC PRESS: .75
NO RETURN FAN HP: — RETURN CFM: — STATIC PRESS: —
NO EXHAUST FAN HP: — EXHAUST CFM: — STATIC PRESS: —
MOTOR STARTER: MNT __ MOM __. SWITCH: P.B. __ H.O.A. ✓ DISCON __

COILS:
HEATING: HW __ STM __ DIRECT FIRED --> NG ✓ OIL __ ELC__ OTHER __
NO COOLING: CW __ DX __. FROM CHILLER _________, FROM DX UNIT _______
NO REHEAT: # OF COILS ___ TYPE _____. RECOOL: # OF COILS ___ TYPE ____
NO HUMIDITY: STM __ SPRAY __ ELC __. HW/CW COIL VALVES: 2 WAY __, 3 WAY __

DAMPERS:
O.A. DAMPER: Y (Y, N), IF YES, FIXED __%, MODULATING __% TO __%
R.A. DAMPER: N (Y, N), IF YES, FIXED __%, MODULATING __% TO __%
E.A. DAMPER: N (Y, N), IF YES, FIXED __%, MODULATING __% TO __%
ECONOMIZER: N (Y, N), IF YES, OA __ RA __ ENTHALPY __
OA LEAKAGE: _30___% IF NO, CAN ECONOMIZER BE ADDED _NO_____

FILTER CONDITION: ___GOOD ___FAIR ___POOR _NONE

SYSTEM OPERATION:	MON - FRI	SAT	SUN
*PRESENT OPERATION:	______ TO _____	_____ TO _____	_____ TO _____
*REQUIRED OPERATION:	_____ TO _____	_____ TO _____	_____ TO _____

	HEATING SETPOINTS				COOLING SETPOINTS			
	WEEKDAYS		WEEKENDS		WEEKDAYS		WEEKENDS	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
*PRESENT TEMP:	_____	_____	_____	_____	_____	_____	_____	_____
*REQUIRED TMP:	_____	_____	_____	_____	_____	_____	_____	_____

HUMIDIFICATION REQUIREMENTS (RH): ____ HUMIDISTAT LOCATION: _____

SYSTEM SETPOINTS: MIXED AIR ___°F, HOT DECK ___°F, COLD DECK ___°F
TIME CLOCK: _Y_ (Y, N), IF YES, IS IT OPERATIONAL _Y_ (Y, N)

CONTROLS: PNEUMATIC ______, ELECTRIC _✓____, PNEUMATIC/ELEC ______

EQUIPMENT CONDITION: EXCELLENT(E), GOOD(G), POOR(P) T'STAT G
H'STAT — COMPR — DAMPERS P LINKAGES G FANS G SHEAVES G
VALVES G ACTUATORS G BELTS G MIXING BOX G
OTHER___

COMMENTS: THIS IS TYPICAL OF TWO (2) UNITS - RT4A ✓ & B ✓.

____

____

--> Disregard if the item is the same as the GENERAL BUILDING DATA.

Bldg No.: 8000 ZONE 1 Page 9 of 41

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

AIR HANDLING UNITS:
CONTROL STRATEGY: BLOWER - ON/OFF W/ PLATE BURNER, MODULATING LEAVING AIR T-STAT W/OVER-RIDING ROOM T-STAT.

ADDITIONAL AHU/SYSTEM COMMENTS: ALL AIR-HANDLERS EFFECT A MAXIMUM AT OF 65°F.

FILM #: ______ FRAME #: ______

SYSTEM SKETCH:

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

EXHAUST FANS:

SIMILARITY GUESS-TIMATION

UNIT NO.	TYPE	AREA	QTY	CFM	HP	STARTER & CONTROL	SETPOINT
PRV 1-1	ROOF	1	1	1575	1/4	MAINTAINED	
PRV 1-2	"	1	2	825	1/10	"	
EF 1-1	"	1	1	15K	7.5	"	
PRV 1-3	"	1	2	11,150	5.0	"	
PRV 1-4	"	1	1	12K	5.0	"	
PRV 1-5	"	1	1	1025	1/2	"	
PRV 1-6	"	1	1	15K	7.5	"	
EF 1-2	CENT	1	1	4K	3/4	"	
EF 1-3	"	1	1	4K	3/4	"	
PRV 2-1	ROOF	2	2	10K	5.0	"	
PRV 2-2	"	2	1	825	1/10	"	
EF 2-1	CENT	2	1	5.2K	1.0	"	
PRV 3-1	ROOF	3	3	825	1/10	"	
PRV 3-2	"	3	1	15K	7.5	"	
EF 1-4	"	1	1	12,750	5.0	"	
EF 2-2	"	2	1	3,200	1.0	"	
EF 2-3	"	2	1	1,200	1/2	"	
PRV 3-3	"	3	1	10,000	5.0		

Zone 1 AHUs

Hrs of Oper./year: 6577 ~~Hrs of Day~~ Degree days X 0.5 days X (0.75 AHU operation) = 2466 ~ 2470 Hrs.

2183 DD. - 520 (HRS ABOVE 80°F) = 1663

FILM #: ________ FRAME #: Tot. Hrs operation = 1663 + 2466 = 4130 HRS.

NOTES: TYPE --> propeller, centrifugal, etc.
STARTER & CONTROL --> momentary, maintained, line v stat, 24 v stat, self contained, etc.

Bldg No.: 8000 ZONE 1

***   FMEA SURVEY OBSERVATIONS   ***

MECHANICAL EQUIPMENT DATA

AIR HANDLING UNITS:
CONTROL STRATEGY: BLOWER - ON/OFF W/PLATE BURNER, MODULATING LEAVING AIR T-STAT W/OVER-RIDING ROOM T-STAT.

ADDITIONAL AHU/SYSTEM COMMENTS: ALL AIR-HANDLERS EFFECT A MAXIMUM ΔT OF 65° F.

FILM #: ______ FRAME #: ______

SYSTEM SKETCH:

Bldg No.: 8000 ZONE 1

*** FMEA SURVEY OBSERVATIONS ***

GENERAL BUILDING DATA ZONE 2 3/19/93 OM

#: 8000 BLDG NAME: CONS FIELD MTCE SHOP JOB #: 124
SURVEYED BY: TEAM 1 DATE: ~~10/15/84~~ BLDG CONTACT: AL JOHNS
CONTACT TELEPHONE NUMBER: 3548/4119 BLDG USAGE: OFFICES
TOT BLDG AREA: 24,330 SF # OF FLOORS: 1 # OF PEOPLE: 110

BUILDING OCCUPANCY:

MON - FRI:	0700	TO	1600	FIRST SHIFT:	_____
SATURDAY:	—	TO	—	SECND SHIFT:	_____
SUNDAY:	—	TO	—	THIRD SHIFT:	_____
HOLIDAYS:	—	TO	—	HOLIDAYS:	_____

ENVIRONMENTAL CONDITIONS:

	HEATING SETPOINTS				COOLING SETPOINTS			
	WEEKDAYS		WEEKENDS		WEEKDAYS		WEEKENDS	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
PRESENT T'STAT:	70°F	70°F	—	—	—	—	—	—
REQUIRED T'STAT:	_____	_____	_____	_____	_____	_____	_____	_____

THERMOSTAT LOCATION(S): _______________
HUMIDIFICATION REQUIREMENTS (RH): — H'STAT LOCATION(S): —

LIGHTING:

	AREA(SF)	LAMP TYPE	#LMPS	W/SF	SCHEDULE
1)	24,330	FL (34W+3½WB)	725	1.12	ON 0700 OFF 1600
2)		(2x6W+2WB)	12		ON ______ OFF ______
3)		(27,355.5 W TOT)			ON ______ OFF ______
4)					ON ______ OFF ______

SOURCE: ✓ OBSERVATION ___ASHRAE ___OTHER
ATTACHED SCHEDULE? ✓ Y ___N

ELECTRIC EQUIPMENT:

	AREA(SF)	TYPE	(KW)	W/SF	SCHEDULE
1)	24,330	GEN OFC EQUIP	42.8	1.76	ON 0700 OFF 1600
2)					ON ______ OFF ______
3)					ON ______ OFF ______
4)					ON ______ OFF ______

DATA SOURCE: ___OBSERVATION ✓ ASHRAE ___OTHER
SEE ATTACHED SCHEDULE? ___Y ✓ N

INTERNAL MASS: MATERIAL: INTERNAL PART'N ESTIMATED MASS: L (L, M, H)

INFILTRATION: LOCATION(S): WINDOWS, OA DAMPERS

ESTIMATED RATE: .25 (L, M, H) or
_____AIR CHANGES or
_____CFM/LIN FT CRACK

*** FMEA SURVEY OBSERVATIONS ***

GENERAL BUILDING DATA

CONSTRUCTION:

WALLS:

	CONSTRUCTION COMPONENT	WIDTH	HEIGHT	AREA (SF)	U-VALUE
N:	—	—	—	—	—
S:	INSUL. MTL PNL	100'-0"	9'-5¾"	948	0.19
E:	INSUL. MTL PNL	243'-4"	7'-0½"	1914	0.19
W:	ZONE 1	—	—	—	—

ROOFS:

CONSTRUCTION COMPONENT	WIDTH	HEIGHT	AREA (SF)	U-VALUE
B.U.R./2" RIG. INS./STL. DK	243'-4"	100'-0	24,330	0.10

WINDOWS:

	AREA (SF)	TYPE	SP	DP	DRAPES
N:	—	—	—	—	—
S:	352	ARCH. PROJ.		✓	N
E:	1188	"		✓	AWNINGS
W:	—	—	—	—	—

FLOOR TYPE: ___ SLAB ___ CRAWL SPACE ___ BASEMENT ✓ OTHER*
AREA: _______ SF

PERIMETER: _______ LF INSULATION? ___Y ___N ___IN ___________

SPECIAL AREAS: ___________

ADDITIONAL NOTES: FLOOR IS IN 2ND STORY SPACE.

FILM #: ________ FRAME #: ___________

SKETCHES:

* Specify in "Additional Notes"

Bldg No.: 8000 ZONE 2

__FMEA_SURVEY_OBSERVATIONS__

GENERAL BUILDING DATA

CELLANEOUS BASE LOADS:
ESTIC HOT WATER:
MANUFACTURER & MODEL _UNKNOWN___________________________
FUEL SOURCE ___ NAT GAS ___ ELEC ___ OIL _✓_ STM GEN ___OTHER*
SUPPLY TEMPERATURE _130_ °F, DISTANCE FROM HEATER _200_ FT
INPUT _440 lb/hr_ RECOVERY RATE _______ OPERATING SCHEDULE _BLDG____

EXTERIOR LIGHTING:
TYPE _MV_________ NO _1_ SCHEDULE _VARIES____ CONTROL _PHOTOCELL_
TYPE _____________ NO ___ SCHEDULE ___________ CONTROL _________
TOTAL KW _0.4_____
FUNCTION OF LIGHTS _✓_ SECURITY ___ PARKING LOT ___ ENTRY
___ OTHER*

ADDITIONAL COMMENTS: _STM GENERATOR SUPPLIED BY BOILERS____
_IN SAME MER.____

FILM #: ______ FRAME #: ______________________________________

ADDITIONAL SKETCHES:

*Specify in "Additional Comments"

Bldg No.: _8000 ZONE 2_ Page _14_ of _41_

*** FMEA SURVEY OBSERVATIONS ***

GENERAL BUILDING DATA

LIGHTING SCHEDULE

Page ___ of ___

AREA: (A) MAIN 24,330 SF (B) MEZZ ________ SF
(A) ________ X ________ (B) ________ X ________

DATA SOURCE: ✓ DRAWINGS ✓ SURVEY TOUR

Mark	#lamps	W/Fix	#Fix	Flr #	Comments
F	3	109	19	A	
	2	75	234	A	
	6	211	33	A	
	1	41	2	A	
	2	15	6	A	
MV	1	460	1	A	EXTERIOR

(A) TOTAL: 27,216 Watts/ 24,330 SF= 1.12 W/SF

(B) TOTAL: ________ Watts/ ________ SF= ________ W/SF

ADDITIONAL NOTES:

AHU1: ea damper has its own controller.
If Temp. rises above a set pt, ~~then~~ O.A. & Exh.A. Close, & R.A. opens.
& opposite is true

O.A. damper control set at 30°F
R.A. " " " " 50°F
Exh A. " " " " 70°F
S.A. control " " ~~60~~ 55°F

Air System needs ~~and~~ EMCS to control dampers via O.A. temp. control; & also to control Air conditioning.

All damper actuators are Honeywell "Modutrol".

Bldg No.: 8000 ZONE 2

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

AIR HANDLING UNITS:
MANUFACTURER UNKNOWN MODEL No. ____
AHU NUMBER: 21-1 AHU TYPE: VERTICAL FLOOR MOUNT
LOCATION: ROOM 21-1 SPACE SERVED: AREA 22

FAN DATA:
SUPPLY FAN HP: ~~7½~~ 5HP SUPPLY CFM: 20,995 STATIC PRESS: 0.5
RETURN FAN HP: — RETURN CFM: — STATIC PRESS: —
* EXHAUST FAN HP: 3 EXHAUST CFM: 18,160 STATIC PRESS: 0.25
MOTOR STARTER: MNT __ MOM __. SWITCH: P.B. __ H.O.A. ✓ DISCON __
EF 21-1 INTERLOCKED

COILS:
HEATING: HW __ STM ✓ DIRECT FIRED --> NG __ OIL __ ELC __ OTHER __
COOLING: CW __ DX ✓. FROM CHILLER ____, FROM DX UNIT 21-1
NO REHEAT: # OF COILS ___ TYPE ____. RECOOL: # OF COILS ___ TYPE ___
NO HUMIDITY: STM __ SPRAY __ ELC __. HW/CW COIL VALVES: 2 WAY __, 3 WAY __

DAMPERS:
O.A. DAMPER: Y (Y, N), IF YES, FIXED 0%, (WIRED SHUT) MODULATING —% TO —%
R.A. DAMPER: Y (Y, N), IF YES, FIXED —%, MODULATING 0% TO 100%
E.A. DAMPER: Y (Y, N), IF YES, FIXED 50%, MODULATING —% TO —%
** ECONOMIZER: Y (Y, N), IF YES, OA ✓ RA __ ENTHALPY __
OA LEAKAGE: ? % IF NO, CAN ECONOMIZER BE ADDED ____

FILTER CONDITION: ___GOOD ___FAIR ✓ POOR PERMANENT

SYSTEM OPERATION: MON - FRI SAT SUN
*PRESENT OPERATION: CONTINUOUS ——→ ——→ ——→
*REQUIRED OPERATION: 0600 TO 1800 — TO — — TO —

	HEATING SETPOINTS				COOLING SETPOINTS			
	WEEKDAYS		WEEKENDS		WEEKDAYS		WEEKENDS	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
*PRESENT TEMP:	70°F	70°F						
*REQUIRED TMP:	65°F	55°F						

NO HUMIDIFICATION REQUIREMENTS (RH): ____ HUMIDISTAT LOCATION: ____

SYSTEM SETPOINTS: MIXED AIR 53 °F, HOT DECK ___ °F, COLD DECK ___ °F
TIME CLOCK: N (Y, N), IF YES, IS IT OPERATIONAL ___ (Y, N)

CONTROLS: PNEUMATIC ____, ELECTRIC ✓, PNEUMATIC/ELEC ____

EQUIPMENT CONDITION: EXCELLENT(E), GOOD(G), POOR(P) T'STAT ___
H'STAT — COMPR — DAMPERS P LINKAGES P FANS G SHEAVES G
VALVES P ACTUATORS G BELTS G MIXING BOX G
OTHER___

COMMENTS: * SEE EXHAUST FAN SCHEDULE—

*ECONOMIZER SENSING BULBS POORLY LOCATED, CONTROL SCHEME IMPOSSIBLE TO ASCERTAIN—

Bldg No.: 8000 ZONE 2

__FMEA_SURVEY_OBSERVATIONS__

MECHANICAL_EQUIPMENT_DATA

AIR HANDLING UNITS:
MANUFACTURER UNKNOWN__________ MODEL No.________________
AHU NUMBER: 21-2 AHU TYPE: VERTICAL FLOOR MOUNT___________
LOCATION: ROOM 21-1________ SPACE SERVED: AREA 22________

FAN DATA:
SUPPLY FAN HP: 7½ SUPPLY CFM: 17230 STATIC PRESS: 0.6
RETURN FAN HP: — RETURN CFM: — STATIC PRESS: —
EXHAUST FAN HP: 3 EXHAUST CFM: 16,260 STATIC PRESS: 0.2
MOTOR STARTER: MNT __ MOM __. SWITCH: P.B. __ H.O.A. ✓ DISCON __
INTERLOCKED W/ RF 21-2

COILS:
HEATING: HW __ STM ✓ DIRECT FIRED --> NG __ OIL __ ELC__ OTHER __
COOLING: CW __ DX ✓. FROM CHILLER _________, FROM DX UNIT _______
NO REHEAT: # OF COILS ___ TYPE _____. RECOOL: # OF COILS ___ TYPE ____
NO HUMIDITY: STM __ SPRAY __ ELC __. HW/CW COIL VALVES: 2 WAY __, 3 WAY __

DAMPERS:
O.A. DAMPER: Y (Y, N), IF YES, FIXED —%, MODULATING 0% TO 100%
R.A. DAMPER: Y (Y, N), IF YES, FIXED —%, MODULATING 0% TO 100%
E.A. DAMPER: Y (Y, N), IF YES, FIXED 50%, MODULATING —% TO —%
* ECONOMIZER: Y (Y, N), IF YES, OA ✓ RA __ ENTHALPY __
OA LEAKAGE: 5 % IF NO, CAN ECONOMIZER BE ADDED ________

FILTER CONDITION: ___GOOD ___FAIR ✓ POOR PERMANENT

SYSTEM OPERATION:	MON - FRI		SAT		SUN	
*PRESENT OPERATION:	**	TO _____	_____	TO _____	_____	TO _____
*REQUIRED OPERATION:	_____	TO _____	_____	TO _____	_____	TO _____

	HEATING SETPOINTS				COOLING SETPOINTS			
	WEEKDAYS		WEEKENDS		WEEKDAYS		WEEKENDS	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
*PRESENT TEMP:								
*REQUIRED TMP:								

HUMIDIFICATION REQUIREMENTS (RH): ____ HUMIDISTAT LOCATION: _____

SYSTEM SETPOINTS: MIXED AIR 53°F, HOT DECK ___°F, COLD DECK ___°F
TIME CLOCK: N (Y, N), IF YES, IS IT OPERATIONAL ___ (Y, N)

CONTROLS: PNEUMATIC ______, ELECTRIC ✓____, PNEUMATIC/ELEC ______

EQUIPMENT CONDITION: EXCELLENT(E), GOOD(G), POOR(P) T'STAT G
H'STAT — COMPR — DAMPERS P LINKAGES P FANS G SHEAVES G
VALVES P ACTUATORS G BELTS G MIXING BOX G
OTHER___

COMMENTS: * SEE NOTES, AHU 21-1 (Same setpts as AHU#1 except
** SEE AHU 21-1 SCHED. S.A. set pt at 45°F.)

--> Disregard if the item is the same as the GENERAL BUILDING DATA.

*****__FMEA_SURVEY_OBSERVATIONS__*****

MECHANICAL_EQUIPMENT_DATA

AIR HANDLING UNITS:
MANUFACTURER UNKNOWN__________ MODEL No.________________
AHU NUMBER: 21-3_ AHU TYPE: VERTICAL, FLOOR MOUNT____________
LOCATION: ROOM 21-1_________ SPACE SERVED: AREA 21__________

FAN DATA:
SUPPLY FAN HP: 5_ SUPPLY CFM: 12200 STATIC PRESS: 0.5
RETURN FAN HP: — RETURN CFM: — STATIC PRESS: —
EXHAUST FAN HP: 1_ EXHAUST CFM: 10,800 STATIC PRESS: 0.1
MOTOR STARTER: MNT __ MOM __. SWITCH: P.B. __ H.O.A. __ DISCON __
INTERLOCKED W/ PRV21-2,4,5

COILS:
HEATING: HW __ STM ✓ DIRECT FIRED --> NG __ OIL __ ELC__ OTHER __
* COOLING: CW __ DX __. FROM CHILLER _________, FROM DX UNIT _______
NO REHEAT: # OF COILS ___ TYPE _____. RECOOL: # OF COILS ___ TYPE ____
NO HUMIDITY: STM __ SPRAY __ ELC __. HW/CW COIL VALVES: 2 WAY __, 3 WAY __

DAMPERS:
O.A. DAMPER: Y_ (Y, N), IF YES, FIXED —%, MODULATING 0 % TO 100%
R.A. DAMPER: Y_ (Y, N), IF YES, FIXED —%, MODULATING 0 % TO 100%
E.A. DAMPER: Y_ (Y, N), IF YES, FIXED 50%, MODULATING — % TO — %
** ECONOMIZER: Y (Y, N), IF YES, OA ✓ RA __ ENTHALPY __
OA LEAKAGE: __5___% IF NO, CAN ECONOMIZER BE ADDED _________

FILTER CONDITION: ___GOOD ___FAIR ✓ POOR PERMANENT

SYSTEM OPERATION:

	MON - FRI			SAT			SUN		
*** *PRESENT OPERATION:	______	TO	_____	_____	TO	_____	_____	TO	_____
*REQUIRED OPERATION:	_____	TO	_____	_____	TO	_____	_____	TO	_____

	HEATING SETPOINTS				COOLING SETPOINTS			
	WEEKDAYS		WEEKENDS		WEEKDAYS		WEEKENDS	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
*PRESENT TEMP:	_____	_____	_____	_____	_____	_____	_____	_____
*REQUIRED TMP:	_____	_____	_____	_____	_____	_____	_____	_____

HUMIDIFICATION REQUIREMENTS (RH): ____ HUMIDISTAT LOCATION: _____

SYSTEM SETPOINTS: MIXED AIR ___°F, HOT DECK ___°F, COLD DECK ___°F
TIME CLOCK: ___ (Y, N), IF YES, IS IT OPERATIONAL ___ (Y, N)

CONTROLS: PNEUMATIC ______, ELECTRIC ✓_____, PNEUMATIC/ELEC ______

EQUIPMENT CONDITION: EXCELLENT(E), GOOD(G), POOR(P) T'STAT G_
H'STAT — COMPR — DAMPERS P LINKAGES P FANS G SHEAVES G
VALVES P ACTUATORS G BELTS G MIXING BOX G
OTHER___

COMMENTS: *EVAP COOLER HAS BEEN RETROFITTED TO SA HOOD.

** SEE COMMENTS, AHU 21-1 –

*** SEE SCHED, AHU 21-1

--> Disregard if the item is the same as the GENERAL BUILDING DATA.

Bldg No.: 8000 ZONE 2

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

AIR HANDLING UNITS:
CONTROL STRATEGY: MAX OV = 2400 FPM. MODULATING TEMP CONTROLLER IN SA, FACE & BYPASS DAMPERS. LOW LIMIT STAT TO SHUT-DOWN FAN & CLOSE OA DAMPERS.

ADDITIONAL AHU/SYSTEM COMMENTS: UNITS USED MAINLY FOR VENTILATION. SA TEMP TEMPERED TO APPROX 70°F. OA & RA DAMPERS ARE MODULATED TO PROVIDE 70°F SA.
BASEBOARD UNITS SUPPLY MOST HEATING IN THIS ZONE. THEY ARE NOT ON T-STATS. 55° OA TEMP SHUTS OFF BB UNITS. MAINTENANCE PERSONNEL MANUALLY REGULATE WATER TEMP TO 160° ABOVE 10°F; 175°F BELOW 10°F.

FILM #: ______ FRAME #: ______

SYSTEM SKETCH:

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

[illegible]ARY HEATING EQUIPMENT:

UNIT NO.	TYPE	OUTPUT CAPACITY	HEATING SOURCE	CFM	HP	STARTER & CONTROL	SETPOINT
21-1A	UH	25.2MBH	HW	~500	1/10	SELF-CONT	70°
21-1B	"	"	"	"	"	"	"
21-1C	"	"	"	"	"	"	"
21-1D	"	"	"	"	"	"	"

FILM #: _______ FRAME #: _______

NOTES: TYPE --> unit heater, unit ventilator, duct furnace, wall furnace, etc.
HEATING SOURCE --> electric, gas fired, oil, steam, hot water, etc.
STARTER & CONTROL --> momentary, maintained, line v stat, 24 v stat, self contained, etc.

Bldg No.: 8000 ZONE 2

MECHANICAL EQUIPMENT DATA

UNITARY COOLING EQUIPMENT:

UNIT NO.	TYPE	CAPACITY	COOLING SOURCE	CFM	HP	STARTER & CONTROL	SETPOINT
ACS-1 *	PKG	42.7 KBTU	ELEC	2.3K/.4	~3/4	T-STAT	73°±2°F
ACS-2 **	RMT	21.2 KBTU	"	800/.35	~1/4	"	"
AC21-1 ***	PKG	53.4 KBTU	"	‡ 2.3K/.35	~3/4		73°DB/60°WB

* W/AIR COOLED CONDENSER

** MATCHED W/CONDENSER UNIT

*** FLOOR MTD W/REMOTE CONDENSER

‡ SUPPLY VOLUME - RETURN VOLUME IS 1775 CFM

FILM #: FRAME #:

NOTES: TYPE --> window unit, split-dx, fan-coil, etc.
COOLING SOURCE --> electric, gas fired, chilled water, etc.
STARTER & CONTROL --> momentary, maintained, line v stat, 24 v stat, self contained, etc.

Bldg No.: 8000 ZONE 2

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

[illegible]UST FANS:

UNIT NO.	TYPE	AREA	USE	CFM	HP	STARTER & CONTROL	SETPOINT
RF21-1	I-L CEN	21	RA/EA	18,160	~7 1/2	ON/OFF/PL	INTERLOCK
PRV21-1	ROOF	21	CLASSROOM	500	~1/10	"	
PRV22-1	"	22	TOILET	2050	~1/3	"	
PRV21-2	"	21	GEN. EXH.	10.8K	~2	"	INTERLOCK SUMMER ONLY
PRV21-3	"	21	TOILET	400	~1/10	"	
* PRV21-4	"	21	DW HOOD	400	~1/10	"	INTERLOCK
* PRV21-5	"	21	GRIDDLE HOOD	1800	~1/3	"	"
RF21-2	I-L CEN	21	RA/EA	16,260	~7 1/2	"	"
PRV21-6	ROOF	21		800	~1/10	"	

* PROBABLY NOT USED —

FILM #: ________ FRAME #: ________

NOTES: TYPE --> propeller, centrifugal, etc.
STARTER & CONTROL --> momentary, maintained, line v stat, 24 v stat, self contained, etc.

Bldg No.: 8000 ZONE 2

*** FMEA SURVEY OBSERVATIONS ***

GENERAL BUILDING DATA ZONE 3

BLDG #: 8000 BLDG NAME: COUS FIELD MTCE SHOP JOB #: 124
SURVEYED BY: TEAM 1 DATE: 10/15/84 BLDG CONTACT: AL JOHNS
CONTACT TELEPHONE NUMBER: 3548/4119 BLDG USAGE: REPAIR FACILITY
TOT BLDG AREA: 128,000 SF # OF FLOORS: 2 # OF PEOPLE: 55

BUILDING OCCUPANCY:					
MON - FRI:	0700	TO	1600	FIRST SHIFT:	_____
SATURDAY:	—	TO	—	SECND SHIFT:	_____
SUNDAY:	—	TO	—	THIRD SHIFT:	_____
HOLIDAYS:	—	TO	—	HOLIDAYS:	_____

ENVIRONMENTAL CONDITIONS:

	HEATING SETPOINTS				COOLING SETPOINTS			
	WEEKDAYS		WEEKENDS		WEEKDAYS		WEEKENDS	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
PRESENT T'STAT:	70°	—						
REQUIRED T'STAT:								

THERMOSTAT LOCATION(S): ____
HUMIDIFICATION REQUIREMENTS (RH): ____ H'STAT LOCATION(S): ____

LIGHTING:

	AREA(SF)	LAMP TYPE	#LMPS	W/SF	SCHEDULE ON	OFF
1)	128,000	FL	1050	2.4	0700	1600
2)			1885			
3)			42			
4)						

DATA SOURCE: ✓ OBSERVATION ___ASHRAE ___OTHER
SEE ATTACHED SCHEDULE? ✓ Y ___N

ELECTRIC EQUIPMENT:

	AREA(SF)	TYPE	(KW)	W/SF	SCHEDULE ON	OFF
1)	128,000	ASSY & LT MFG	1920	15	0700	1600
2)						
3)						
4)						

DATA SOURCE: ___OBSERVATION ✓ ASHRAE ___OTHER
SEE ATTACHED SCHEDULE? ___Y ✓ N

INTERNAL MASS: MATERIAL: STL/CONC/INVENTORY ESTIMATED MASS: H (L, M, H)

INFILTRATION: LOCATION(S): OH, BIFOLD ENTRY DOORS

ESTIMATED RATE: _____(L, M, H) or
.75 AIR CHANGES or
_____CFM/LIN FT CRACK

*** FMEA SURVEY OBSERVATIONS ***

GENERAL BUILDING DATA

STRUCTION:

ALLS:	CONSTRUCTION COMPONENT	WIDTH	HEIGHT	AREA (SF)	U-VALUE
N:	83% IMP* / 17% OHD & CMU	358'-0"	30'-5"	10,893	0.22
S:	78% " / 22% "	358'-0"	23'-0"	8,249	0.23
E:	79% " / 21% "	385'-0"	23'-1"	8,889	0.22
W:	85% " / 15% "	124'-0	24'-6"	3,037	0.21

ROOFS:	CONSTRUCTION COMPONENT	WIDTH	HEIGHT	AREA (SF)	U-VALUE
	BUR/2" RIG INS/MTL DECK	370'-0	245-6 3/4"	90,857	0.10

WINDOWS:	AREA (SF)	TYPE	SF	DF	DRAPES
N:	87.0	ARCH PROJ		✓	N
S:	1219.0	"		✓	N
E:	344.0	"		✓	N
W:	21.0	FIXED	✓		N

FLOOR TYPE: ✓ SLAB ___ CRAWL SPACE ___ BASEMENT ___ OTHER*
AREA: 115,400 SF

PERIMETER: 1,235 LF INSULATION? ✓ Y ___ N 2 IN RIG TO 24"

SPECIAL AREAS: ______

ITIONAL NOTES: ______

*IMP = INSULATED METAL PANEL / OHD = OVER-HEAD DOOR

FILM #: ________ FRAME #: ________

SKETCHES:

*Specify in "Additional Notes"

Bldg No.: 8000 ZONE 3

*** FMEA SURVEY OBSERVATIONS ***

GENERAL BUILDING DATA

MISCELLANEOUS BASE LOADS:
DOMESTIC HOT WATER:
MANUFACTURER & MODEL SEE ZONE 2
FUEL SOURCE ___ NAT GAS ___ ELEC ___ OIL ___ STM GEN ___ OTHER*
SUPPLY TEMPERATURE _____ °F, DISTANCE FROM HEATER _____ FT
INPUT ______ RECOVERY RATE _______ OPERATING SCHEDULE ___________

EXTERIOR LIGHTING:
TYPE MV NO 19 SCHEDULE ___________ CONTROL PHOTOCELL
TYPE ___________ NO ___ SCHEDULE ___________ CONTROL _________
TOTAL KW 8.7
FUNCTION OF LIGHTS ✓ SECURITY ___ PARKING LOT ___ ENTRY
___ OTHER*

ADDITIONAL COMMENTS: ______________________________

FILM #: ______ FRAME #: ______________________

ADDITIONAL SKETCHES:

* Specify in "Additional Comments"

Bldg No.: 8000 ZONE 3

*** FMEA SURVEY OBSERVATIONS ***

GENERAL BUILDING DATA

LIGHTING SCHEDULE

AREA: (A) MAIN 128,000 SF (B) MEZZ ______________ SF
(A) _________ X _________ (B) _________ X _________

DATA SOURCE: ✓ DRAWINGS ✓ SURVEY TOUR

Mark	#lamps	W/Fix	#Fix	Flr #	Comments
F	2	230	525	A	8' WATT MISER OR EQ.
	4	143	46	A	4' "
	2	75	494	A	4' "
	2	6	21	A	EXIT LIGHTS
	3*	75	241	A	*3 LAMP TROFFER W/ 1 LAMP DISABLED
I	1	100	5	A	UTILITY TUNNEL
MV	1	400	19	A	EXTERIOR

(A) TOTAL: 190,679 Watts/ 128,000 SF= 1.49 W/SF

(B) TOTAL: ______________ Watts/ ______________ SF= ________ W/SF

ADDITIONAL NOTES:

Bldg No.: ___________

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

AIR HANDLING UNITS:
MANUFACTURER UNKNOWN MODEL No. ____
AHU NUMBER: 4-1A&B AHU TYPE: HORIZONTAL, CEILING MOUNT
LOCATION: AREA 4 SPACE SERVED: AREA 4

FAN DATA:
SUPPLY FAN HP: ~1 SUPPLY CFM: 4050 STATIC PRESS: 0.35
RETURN FAN HP: — RETURN CFM: — STATIC PRESS: —
EXHAUST FAN HP: * EXHAUST CFM: ____ STATIC PRESS: ___
MOTOR STARTER: MNT __ MOM __. SWITCH: P.B. __ H.O.A. ✓ DISCON __
INTERLOCKED W/ PRV4-1 & 4-2

COILS: 5 PSI @ 232 KBTU/HR
HEATING: HW __ STM ✓ DIRECT FIRED --> NG __ OIL __ ELC__ OTHER __
NO COOLING: CW __ DX __. FROM CHILLER ________, FROM DX UNIT _______
NO REHEAT: # OF COILS ___ TYPE _____. RECOOL: # OF COILS ___ TYPE ____
NO HUMIDITY: STM __ SPRAY __ ELC __. HW/CW COIL VALVES: 2 WAY __, 3 WAY __

DAMPERS:
O.A. DAMPER: Y (Y, N), IF YES, FIXED 0 %, MODULATING — % TO — %
R.A. DAMPER: Y (Y, N), IF YES, FIXED 60 %, MODULATING — % TO — %
E.A. DAMPER: N (Y, N), IF YES, FIXED — %, MODULATING — % TO — %
ECONOMIZER: N (Y, N), IF YES, OA __ RA __ ENTHALPY __
OA LEAKAGE: 0 % IF NO, CAN ECONOMIZER BE ADDED Y

FILTER CONDITION: ___GOOD ___FAIR ___POOR UNK

SYSTEM OPERATION:

	MON - FRI			SAT			SUN		
*PRESENT OPERATION:	______	TO	______	______	TO	______	______	TO	______
*REQUIRED OPERATION:	______	TO	______	______	TO	______	______	TO	______

	HEATING SETPOINTS				COOLING SETPOINTS			
	WEEKDAYS		WEEKENDS		WEEKDAYS		WEEKENDS	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
*PRESENT TEMP:	68	68						
*REQUIRED TMP:								

HUMIDIFICATION REQUIREMENTS (RH): ____ HUMIDISTAT LOCATION: _____

SYSTEM SETPOINTS: MIXED AIR 68 °F, HOT DECK ___ °F, COLD DECK ___ °F
TIME CLOCK: Y (Y, N), IF YES, IS IT OPERATIONAL Y (Y, N)

CONTROLS: PNEUMATIC ______, ELECTRIC ✓, PNEUMATIC/ELEC ______

EQUIPMENT CONDITION: EXCELLENT(E), GOOD(G), POOR(P) T'STAT ___
H'STAT — COMPR — DAMPERS P LINKAGES P FANS G SHEAVES G
VALVES P ACTUATORS G BELTS G MIXING BOX G
OTHER ___

COMMENTS: UNIT DESIGNED FOR 100% OA OPERATION. INTAKE HAS BEEN BLOCKED W/ PLYWOOD & INSPECTION DOORS WIRED OPEN TO ACHIEVE 100% RA.
* SEE EXHAUST FAN SCHEDULE — Problem has been corrected

__FMEA SURVEY OBSERVATIONS__

MECHANICAL EQUIPMENT DATA

AIR HANDLING UNITS:
MANUFACTURER UNKNOWN MODEL No. ______
AHU NUMBER: 6-1 AHU TYPE: HORIZONTAL CEILING MOUNT
LOCATION: AREA 6 SPACE SERVED: AREA 6

FAN DATA:
SUPPLY FAN HP: ~1½ SUPPLY CFM: 6000 STATIC PRESS: 0.4
RETURN FAN HP: — RETURN CFM: — STATIC PRESS: —
EXHAUST FAN HP: — EXHAUST CFM: — STATIC PRESS: —
MOTOR STARTER: MNT __ MOM __. SWITCH: P.B. __ H.O.A. ✓ DISCON __
INTERLOCKED W/PRV 6-1

COILS:
HEATING: HW __ STM ✓ 5 PSI @ 330 KBTUH DIRECT FIRED --> NG __ OIL __ ELC __ OTHER __
NO COOLING: CW __ DX __. FROM CHILLER ______, FROM DX UNIT ______
NO REHEAT: # OF COILS ___ TYPE _____. RECOOL: # OF COILS ___ TYPE ____
NO HUMIDITY: STM __ SPRAY __ ELC __. HW/CW COIL VALVES: 2 WAY __, 3 WAY __

DAMPERS:
O.A. DAMPER: Y (Y, N), IF YES, FIXED 0 %, MODULATING — % TO — %
R.A. DAMPER: Y (Y, N), IF YES, FIXED 100 %, MODULATING — % TO — %
E.A. DAMPER: N (Y, N), IF YES, FIXED — %, MODULATING — % TO — %
ECONOMIZER: N (Y, N), IF YES, OA __ RA __ ENTHALPY __
OA LEAKAGE: 10 % IF NO, CAN ECONOMIZER BE ADDED Y

FILTER CONDITION: ___GOOD ___FAIR ___POOR UNK

SYSTEM OPERATION:	MON - FRI		SAT		SUN	
*PRESENT OPERATION:	____	TO ____	____	TO ____	____	TO ____
*REQUIRED OPERATION:	____	TO ____	____	TO ____	____	TO ____

	HEATING SETPOINTS				COOLING SETPOINTS			
	WEEKDAYS		WEEKENDS		WEEKDAYS		WEEKENDS	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
*PRESENT TEMP:								
*REQUIRED TMP:								

HUMIDIFICATION REQUIREMENTS (RH): ____ HUMIDISTAT LOCATION: _____

SYSTEM SETPOINTS: MIXED AIR ___°F, HOT DECK ___°F, COLD DECK ___°F
TIME CLOCK: Y (Y, N), IF YES, IS IT OPERATIONAL Y (Y, N)

CONTROLS: PNEUMATIC ______, ELECTRIC ✓, PNEUMATIC/ELEC ______

EQUIPMENT CONDITION: EXCELLENT(E), GOOD(G), POOR(P) T'STAT ___
H'STAT — COMPR — DAMPERS P LINKAGES P FANS G SHEAVES G
VALVES P ACTUATORS G BELTS G MIXING BOX G
OTHER___

COMMENTS: SEE COMMENTS FOR UNIT 4-1

--> Disregard if the item is the same as the GENERAL BUILDING DATA.

Bldg No.: 3000 ZONE 3

__FMEA_SURVEY_OBSERVATIONS__

MECHANICAL_EQUIPMENT_DATA

AIR HANDLING UNITS:
MANUFACTURER UNKNOWN____________ MODEL No.____________
AHU NUMBER: 6-2 AHU TYPE: HORIZONTAL, CEILING MOUNT__________
LOCATION: AREA 6____________ SPACE SERVED: MACHINE & RADIATOR SHOPS

FAN DATA:
SUPPLY FAN HP: ~1½ SUPPLY CFM: 6300 STATIC PRESS: 0.4
RETURN FAN HP: — RETURN CFM: — STATIC PRESS: —
EXHAUST FAN HP: — EXHAUST CFM: — STATIC PRESS: —
MOTOR STARTER: MNT __ MOM __. SWITCH: P.B. __ H.O.A. ✓ DISCON __
INTERLOCKED W/ PRV 6-2

COILS:
HEATING: HW __ STM ✓ DIRECT FIRED --> NG __ OIL __ ELC__ OTHER __ 5PSI @ 350 KBTUH
COOLING: CW __ DX __. FROM CHILLER ________, FROM DX UNIT ______
REHEAT: # OF COILS ___ TYPE _____. RECOOL: # OF COILS ___ TYPE ____
HUMIDITY: STM __ SPRAY __ ELC __. HW/CW COIL VALVES: 2 WAY __, 3 WAY __

DAMPERS:
O.A. DAMPER: Y (Y, N), IF YES, FIXED 0 %, MODULATING — % TO — %
R.A. DAMPER: Y (Y, N), IF YES, FIXED 100 %, MODULATING — % TO — %
E.A. DAMPER: N (Y, N), IF YES, FIXED — %, MODULATING — % TO — %
ECONOMIZER: N (Y, N), IF YES, OA — RA — ENTHALPY —
OA LEAKAGE: __10___% IF NO, CAN ECONOMIZER BE ADDED __Y______

FILTER CONDITION: ___GOOD ___FAIR ___POOR UNK

SYSTEM OPERATION:

	MON - FRI		SAT		SUN	
*PRESENT OPERATION:	______ TO	_____	_____ TO	_____	_____ TO	_____
*REQUIRED OPERATION:	_____ TO	_____	_____ TO	_____	_____ TO	_____

	HEATING SETPOINTS				COOLING SETPOINTS			
	WEEKDAYS		WEEKENDS		WEEKDAYS		WEEKENDS	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
*PRESENT TEMP:	_____	_____	_____	_____	_____	_____	_____	_____
*REQUIRED TMP:	_____	_____	_____	_____	_____	_____	_____	_____

HUMIDIFICATION REQUIREMENTS (RH): ____ HUMIDISTAT LOCATION: _____

SYSTEM SETPOINTS: MIXED AIR ___°F, HOT DECK ___°F, COLD DECK ___°F
TIME CLOCK: Y__ (Y, N), IF YES, IS IT OPERATIONAL Y__ (Y, N)

CONTROLS: PNEUMATIC ______, ELECTRIC ✓____, PNEUMATIC/ELEC ______

EQUIPMENT CONDITION: EXCELLENT(E), GOOD(G), POOR(P) T'STAT ___
H'STAT — COMPR — DAMPERS P LINKAGES G FANS G SHEAVES G
VALVES P ACTUATORS G BELTS G MIXING BOX G
OTHER___

COMMENTS: SEE COMMENTS FOR UNIT 4-1______________________

____

____

--> Disregard if the item is the same as the GENERAL BUILDING DATA.

***** FMEA SURVEY OBSERVATIONS *****

MECHANICAL EQUIPMENT DATA

AIR HANDLING UNITS:
MANUFACTURER UNKNOWN_________ MODEL No.__________________
AHU NUMBER: 6-3 AHU TYPE: HORIZONTAL, CEILING MOUNT
LOCATION: AREA 6____________ SPACE SERVED: TOILET & LOCKER RMS

FAN DATA:
SUPPLY FAN HP: 3/4 SUPPLY CFM: 2130 STATIC PRESS: 0.45
RETURN FAN HP: — RETURN CFM: — STATIC PRESS: —
EXHAUST FAN HP: — EXHAUST CFM: — STATIC PRESS: —
MOTOR STARTER: MNT __ MOM __. SWITCH: P.B. __ H.O.A. ✓ DISCON __
INTERLOCKED W/PRV 6-3

COILS:
HEATING: HW __ STM ✓ DIRECT FIRED 5PSI @ 140 KBTUH NG __ OIL __ ELC__ OTHER __
NO COOLING: CW __ DX __. FROM CHILLER _________, FROM DX UNIT _______
NO REHEAT: # OF COILS ___ TYPE _____. RECOOL: # OF COILS ___ TYPE ____
NO HUMIDITY: STM __ SPRAY __ ELC __. HW/CW COIL VALVES: 2 WAY __, 3 WAY __

DAMPERS:
O.A. DAMPER: Y (Y, N), IF YES, FIXED 0%, MODULATING —% TO —%
R.A. DAMPER: Y (Y, N), IF YES, FIXED 100%, MODULATING —% TO —%
E.A. DAMPER: N (Y, N), IF YES, FIXED —%, MODULATING —% TO —%
ECONOMIZER: N (Y, N), IF YES, OA — RA — ENTHALPY —
OA LEAKAGE: __10___% IF NO, CAN ECONOMIZER BE ADDED __Y_____

FILTER CONDITION: ___GOOD ___FAIR ___POOR UNK

SYSTEM OPERATION:	MON - FRI		SAT		SUN	
*PRESENT OPERATION:	______ TO	_____	_____ TO	_____	_____ TO	_____
*REQUIRED OPERATION:	_____ TO	_____	_____ TO	_____	_____ TO	_____

	HEATING SETPOINTS				COOLING SETPOINTS			
	WEEKDAYS		WEEKENDS		WEEKDAYS		WEEKENDS	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
*PRESENT TEMP:	_____	_____	_____	_____	_____	_____	_____	_____
*REQUIRED TMP:	_____	_____	_____	_____	_____	_____	_____	_____

HUMIDIFICATION REQUIREMENTS (RH): ____ HUMIDISTAT LOCATION: _____

SYSTEM SETPOINTS: MIXED AIR ___°F, HOT DECK ___°F, COLD DECK ___°F
TIME CLOCK: Y (Y, N), IF YES, IS IT OPERATIONAL Y (Y, N)

CONTROLS: PNEUMATIC ______, ELECTRIC ✓, PNEUMATIC/ELEC ______

EQUIPMENT CONDITION: EXCELLENT(E), GOOD(G), POOR(P) T'STAT ___
H'STAT — COMPR — DAMPERS P LINKAGES P FANS G SHEAVES G
VALVES P ACTUATORS G BELTS G MIXING BOX G
OTHER___

COMMENTS: SEE COMMENTS FOR AHU 4-1

--> Disregard if the item is the same as the GENERAL BUILDING DATA.

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

AIR HANDLING UNITS:
MANUFACTURER UNKNOWN ____ MODEL No. ____
AHU NUMBER: 7-1 AHU TYPE: HORIZONTAL CEILING MOUNT ____
LOCATION: AREA 7 ____ SPACE SERVED: STORAGE & REPAIR

FAN DATA:
SUPPLY FAN HP: ~5 SUPPLY CFM: 8300 STATIC PRESS: 0.7
RETURN FAN HP: — RETURN CFM: — STATIC PRESS: —
EXHAUST FAN HP: — EXHAUST CFM: — STATIC PRESS: —
MOTOR STARTER: MNT __ MOM __. SWITCH: P.B. __ H.O.A. ✓ DISCON __
INTERLOCKED W/PRV 7-1

COILS:
HEATING: HW __ STM ✓ DIRECT FIRED --> NG __ OIL __ ELC __ OTHER __ 5 PSI @ 535 KBTUH
NO COOLING: CW __ DX __. FROM CHILLER ____, FROM DX UNIT ____
NO REHEAT: # OF COILS ___ TYPE ____. RECOOL: # OF COILS ___ TYPE ____
NO HUMIDITY: STM __ SPRAY __ ELC __. HW/CW COIL VALVES: 2 WAY __, 3 WAY __

DAMPERS:
O.A. DAMPER: Y (Y, N), IF YES, FIXED Ø %, MODULATING — % TO — %
R.A. DAMPER: Y (Y, N), IF YES, FIXED * %, MODULATING — % TO — %
E.A. DAMPER: N (Y, N), IF YES, FIXED — %, MODULATING — % TO — %
ECONOMIZER: N (Y, N), IF YES, OA — RA — ENTHALPY —
OA LEAKAGE: 10 % IF NO, CAN ECONOMIZER BE ADDED Y

FILTER CONDITION: ___GOOD ___FAIR ___POOR UNK

SYSTEM OPERATION:

	MON - FRI	SAT	SUN
*PRESENT OPERATION:	___ TO ___	___ TO ___	___ TO ___
*REQUIRED OPERATION:	___ TO ___	___ TO ___	___ TO ___

	HEATING SETPOINTS				COOLING SETPOINTS			
	WEEKDAYS		WEEKENDS		WEEKDAYS		WEEKENDS	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
*PRESENT TEMP:								
*REQUIRED TMP:								

HUMIDIFICATION REQUIREMENTS (RH): ____ HUMIDISTAT LOCATION: ____

SYSTEM SETPOINTS: MIXED AIR ___°F, HOT DECK ___°F, COLD DECK ___°F
TIME CLOCK: Y (Y, N), IF YES, IS IT OPERATIONAL Y (Y, N)

CONTROLS: PNEUMATIC ____, ELECTRIC ✓, PNEUMATIC/ELEC ____

EQUIPMENT CONDITION: EXCELLENT(E), GOOD(G), POOR(P) T'STAT ___
H'STAT — COMPR — DAMPERS P LINKAGES P FANS G SHEAVES G
VALVES P ACTUATORS G BELTS G MIXING BOX G
OTHER ___

COMMENTS: ____

* SEE H&V UNIT SCHEDULE, ATTACHED AS APPENDIX
--> Disregard if the item is the same as the GENERAL BUILDING DATA.

Bldg No.: 8000 ZONE 3

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

AIR HANDLING UNITS:
MANUFACTURER UNKNOWN MODEL No. ____
AHU NUMBER: 7-2 AHU TYPE: HORIZONTAL CEILING MOUNT
LOCATION: AREA 7 SPACE SERVED: BATTERY CHARGING & REPAIR

FAN DATA:
SUPPLY FAN HP: ~1½ SUPPLY CFM: 3850 STATIC PRESS: 0.5
RETURN FAN HP: — RETURN CFM: — STATIC PRESS: —
EXHAUST FAN HP: — EXHAUST CFM: — STATIC PRESS: —
MOTOR STARTER: MNT __ MOM __. SWITCH: P.B. __ H.O.A. ✓ DISCON __
INTERLOCKED W/ PRV 7-2

COILS:
5 PSI @ 319 KBTUH
HEATING: HW __ STM ✓ DIRECT FIRED --> NG __ OIL __ ELC __ OTHER __
NO COOLING: CW __ DX __. FROM CHILLER ____, FROM DX UNIT ____
NO REHEAT: # OF COILS ___ TYPE ____. RECOOL: # OF COILS ___ TYPE ____
NO HUMIDITY: STM __ SPRAY __ ELC __. HW/CW COIL VALVES: 2 WAY __, 3 WAY __

DAMPERS:
O.A. DAMPER: Y (Y, N), IF YES, FIXED 100%, MODULATING __% TO __%
R.A. DAMPER: N (Y, N), IF YES, FIXED __%, MODULATING __% TO __%
E.A. DAMPER: N (Y, N), IF YES, FIXED __%, MODULATING __% TO __%
ECONOMIZER: N (Y, N), IF YES, OA __ RA __ ENTHALPY __
OA LEAKAGE: ____% IF NO, CAN ECONOMIZER BE ADDED Y

FILTER CONDITION: ___GOOD ___FAIR ___POOR UNK

SYSTEM OPERATION:	MON - FRI			SAT			SUN		
*PRESENT OPERATION:	____	TO	____	____	TO	____	____	TO	____
*REQUIRED OPERATION:	____	TO	____	____	TO	____	____	TO	____

	HEATING SETPOINTS				COOLING SETPOINTS			
	WEEKDAYS		WEEKENDS		WEEKDAYS		WEEKENDS	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
*PRESENT TEMP:								
*REQUIRED TMP:								

HUMIDIFICATION REQUIREMENTS (RH): ____ HUMIDISTAT LOCATION: ____

SYSTEM SETPOINTS: MIXED AIR ___°F, HOT DECK ___°F, COLD DECK ___°F
TIME CLOCK: Y (Y, N), IF YES, IS IT OPERATIONAL Y (Y, N)

CONTROLS: PNEUMATIC ____, ELECTRIC ✓, PNEUMATIC/ELEC ____

EQUIPMENT CONDITION: EXCELLENT(E), GOOD(G), POOR(P) T'STAT ___
H'STAT — COMPR — DAMPERS P LINKAGES P FANS G SHEAVES G
VALVES P ACTUATORS G BELTS G MIXING BOX G
OTHER___

COMMENTS: SEE COMMENTS FOR UNIT 4-1

Bldg No.: 8000 ZONE 3

__FMEA_SURVEY_OBSERVATIONS__

MECHANICAL_EQUIPMENT_DATA

AIR HANDLING UNITS:
MANUFACTURER UNKNOWN______________ MODEL No.____________________
AHU NUMBER: 8-1 AHU TYPE: HORIZONTAL, CEILING MOUNT__________
LOCATION: AREA 8_____________ SPACE SERVED: ____________________

✓ FAN DATA:
SUPPLY FAN HP: ~3/4 SUPPLY CFM: 2820 STATIC PRESS: 0.4
RETURN FAN HP: — RETURN CFM: — STATIC PRESS: —
EXHAUST FAN HP: — EXHAUST CFM: — STATIC PRESS: —
MOTOR STARTER: MNT __ MOM __. SWITCH: P.B. __ H.O.A. ✓ DISCON __
INTERLOCKED W/PRV 8-1

COILS:
HEATING: HW __ STM ✓ DIRECT FIRED --> NG __ OIL __ ELC__ OTHER __ 5PSI @ 156 KBTUH
NO COOLING: CW __ DX __. FROM CHILLER _________, FROM DX UNIT _______
NO REHEAT: # OF COILS ___ TYPE _____. RECOOL: # OF COILS ___ TYPE ____
NO HUMIDITY: STM __ SPRAY __ ELC __. HW/CW COIL VALVES: 2 WAY __, 3 WAY __

DAMPERS:
O.A. DAMPER: Y (Y, N), IF YES, FIXED 0%, MODULATING —% TO —%
R.A. DAMPER: Y (Y, N), IF YES, FIXED 100%, MODULATING —% TO —%
E.A. DAMPER: N (Y, N), IF YES, FIXED —%, MODULATING —% TO —%
ECONOMIZER: N (Y, N), IF YES, OA — RA — ENTHALPY —
OA LEAKAGE: 10% % IF NO, CAN ECONOMIZER BE ADDED Y______

FILTER CONDITION: ___GOOD ___FAIR ___POOR UNK

SYSTEM OPERATION: MON - FRI SAT SUN
*PRESENT OPERATION: ______ TO _____ _____ TO _____ _____ TO _____
*REQUIRED OPERATION: _____ TO _____ _____ TO _____ _____ TO _____

	HEATING SETPOINTS				COOLING SETPOINTS			
	WEEKDAYS		WEEKENDS		WEEKDAYS		WEEKENDS	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
*PRESENT TEMP:	_____	_____	_____	_____	_____	_____	_____	_____
*REQUIRED TMP:	_____	_____	_____	_____	_____	_____	_____	_____

HUMIDIFICATION REQUIREMENTS (RH): ____ HUMIDISTAT LOCATION: _____

SYSTEM SETPOINTS: MIXED AIR 68°F, HOT DECK ___°F, COLD DECK ___°F
TIME CLOCK: Y (Y, N), IF YES, IS IT OPERATIONAL Y (Y, N)

CONTROLS: PNEUMATIC ______, ELECTRIC ✓, PNEUMATIC/ELEC ______

EQUIPMENT CONDITION: EXCELLENT(E), GOOD(G), POOR(P) T'STAT ___
H'STAT — COMPR — DAMPERS P LINKAGES P FANS G SHEAVES G
VALVES P ACTUATORS G BELTS G MIXING BOX G
OTHER___

COMMENTS: SEE COMMENTS FOR UNIT 4-1____________________

____

____

--> Disregard if the item is the same as the GENERAL BUILDING DATA.

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

AIR HANDLING UNITS:
MANUFACTURER UNKNOWN MODEL No. ____
AHU NUMBER: 9-1 AHU TYPE: HORIZONTAL, CEILING MOUNT
LOCATION: AREA 9 SPACE SERVED: ____

FAN DATA:
SUPPLY FAN HP: ~3 SUPPLY CFM: 8100 STATIC PRESS: 0.6
RETURN FAN HP: — RETURN CFM: — STATIC PRESS: —
EXHAUST FAN HP: — EXHAUST CFM: — STATIC PRESS: —
MOTOR STARTER: MNT __ MOM __. SWITCH: P.B. __ H.O.A. ✓ DISCON __
INTERLOCKED W/ PRV 9-1 (SUMMER ONLY)

COILS:
HEATING: HW ✓ STM ~~NW~~ DIRECT FIRED --> NG __ OIL __ ELC __ OTHER __ 5 PSIG 175.3 KBTUH
NO COOLING: CW __ DX __. FROM CHILLER ____, FROM DX UNIT ____
NO REHEAT: # OF COILS ___ TYPE ___. RECOOL: # OF COILS ___ TYPE ___
NO HUMIDITY: STM __ SPRAY __ ELC __. HW/CW COIL VALVES: 2 WAY __, 3 WAY __

DAMPERS:
O.A. DAMPER: Y (Y, N), IF YES, FIXED ~~0~~%, MODULATING 20% TO 100%
R.A. DAMPER: Y (Y, N), IF YES, FIXED ~~100~~%, MODULATING —% TO —%
E.A. DAMPER: N (Y, N), IF YES, FIXED —%, MODULATING —% TO —%
ECONOMIZER: N (Y, N), IF YES, OA — RA — ENTHALPY —
OA LEAKAGE: 10 % IF NO, CAN ECONOMIZER BE ADDED Y

FILTER CONDITION: ___GOOD ___FAIR ___POOR UNK

SYSTEM OPERATION:	MON - FRI	SAT	SUN
*PRESENT OPERATION:	___ TO ___	___ TO ___	___ TO ___
*REQUIRED OPERATION:	___ TO ___	___ TO ___	___ TO ___

	HEATING SETPOINTS				COOLING SETPOINTS			
	WEEKDAYS		WEEKENDS		WEEKDAYS		WEEKENDS	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
*PRESENT TEMP:								
*REQUIRED TMP:								

HUMIDIFICATION REQUIREMENTS (RH): ____ HUMIDISTAT LOCATION: ____

SYSTEM SETPOINTS: ~~MIXED~~ SUPPLY AIR 68 °F, HOT DECK ___ °F, COLD DECK ___ °F
TIME CLOCK: Y (Y, N), IF YES, IS IT OPERATIONAL Y (Y, N)

CONTROLS: PNEUMATIC ____, ELECTRIC ✓, PNEUMATIC/ELEC ____

EQUIPMENT CONDITION: EXCELLENT(E), GOOD(G), POOR(P) T'STAT ___
H'STAT — COMPR — DAMPERS P LINKAGES P FANS G SHEAVES G
VALVES P ACTUATORS G BELTS G MIXING BOX G
OTHER___

COMMENTS: SEE COMMENTS FOR UNIT 4-1 Fan motor recently replaced; 5 HP. Hi Eff. Baldor
AHU has been modified w/ an evap. cooler on roof; Htg C.V. leaks by - replace. 1" Valve
T-STAT Modulates 3-Way Heating Valve; Other TSTAT modulates O.A. & R.A. dampers. ACTUATORS
--> Disregard if the item is the same as the GENERAL BUILDING DATA.

***** FMEA SURVEY OBSERVATIONS *****

MECHANICAL EQUIPMENT DATA

AIR HANDLING UNITS:
CONTROL STRATEGY: SEE ATTACHED-

ADDITIONAL AHU/SYSTEM COMMENTS:

FILM #: ______ FRAME #: ______

SYSTEM SKETCH:

Bldg No.: 8000 ZONES 1,2,3

AREA 4 / SHT M16

*** UNITARY HEATING EQUIPMENT ***

UNIT NO.	TYPE	OUTPUT CAPACITY	HEATING SOURCE	CFM	HP	STARTER & CONTROL	SETPOINT
4-1	UH	25 MBH	HW			SELF CONT	70°
4-2	FTR	6 MBH	HW			"	"
4-3	UH	12 MBH	HW			"	"
4-4	UH	12 MBH	HW			"	"
4-5	FTR	5 MBH	HW			"	"
4-6	UH	75 MBH	HW			"	"
4-8	UH	200 MBH	HW			"	"
4-13	UH	29 MBH	HW			"	"
			AREA 5			"	"
5-5	UH	32 MBH	HW			"	"
5-10	UH	32 MBH	HW			"	"

NOTES: TYPE --> unit heater, unit ventilator, duct furnace, wall furnace, etc.
HEATING SOURCE --> electric, gas fired, oil, steam, hot water, etc.
STARTER & CONTROL --> momentary, maintained, line v stat, 24 v stat, self contained, etc.

BLDG 8000

AREA 6,7,8

*** UNITARY HEATING EQUIPMENT ***

UNIT NO.	TYPE	OUTPUT CAPACITY	HEATING SOURCE	CFM	HP	STARTER & CONTROL	SETPOINT
6-6	UH	14.3MBH	HW			SELF CONT.	70°
6-9	UH	22.Ø MBH	HW			"	"
6-1Ø	UH	22.Ø MBH	HW			"	"
6-11	UH	62.4MBH	HW			"	"
		AREA 7					
7-1	UH	27.Ø MBH	HW			"	"
7-3	UH	22.Ø MBH	HW			"	"
7-8	UH	30.Ø MBH	HW			"	"
		AREA 8					
8-1	UH	22.5MBH	HW			"	"
8-2	UH	22.5MBH	HW			"	"
8-3A	UH	3Ø.Ø MBH	HW			"	"
8-3B	UH	35.Ø MBH	HW			"	"
8-4A	UH	35.Ø MBH	HW			"	"
8-4B	UH	53.2 MBH	HW			"	"
8-4C	UH	35.Ø MBH	HW			"	"

FILM #: ______ FRAME #: ______

NOTES: TYPE --> unit heater, unit ventilator, duct furnace, wall furnace, etc.
HEATING SOURCE --> electric, gas fired, oil, steam, hot water, etc.
STARTER & CONTROL --> momentary, maintained, line v stat, 24 v stat, self contained, etc.

BLDG 8000

AREA 9

*** UNITARY HEATING EQUIPMENT ***

UNIT NO.	TYPE	OUTPUT CAPACITY	HEATING SOURCE	CFM	HP	STARTER & CONTROL	SETPOINT
9-1A	UH	43.Ø MBH	HW			SELF CONT	70°
9-1B	UH	43Ø MBH	HW			"	"
9-1C	UH	43Ø MBH	HW			"	"
9-8	FTR	6.4 MBH	HW			"	"
9-1ØA	UH	63.Ø MBH	HW			"	"
9-1ØB	UH	63.Ø MBH	HW			"	"
9-11	FTR	9.Ø MBH	HW			"	"
9-16	FTR	9.1 MBH	HW			"	"
9-18	FTR	5.Ø MBH	HW			"	"
9-19	FTR	10.6 MBH	HW			"	"

FILM #: _______ FRAME #: _______

NOTES: TYPE --> unit heater, unit ventilator, duct furnace, wall furnace, etc.
HEATING SOURCE --> electric, gas fired, oil, steam, hot water, etc.
STARTER & CONTROL --> momentary, maintained, line v stat, 24 v stat, self contained, etc.

BLDG 8000

MECHANICAL EQUIPMENT DATA

EXHAUST FANS:

UNIT NO.	TYPE	AREA	USE	CFM	HP	STARTER & CONTROL	SETPOINT
EF7-4	ROOF	7	TP EXH	4K	~1	ON-OFF/PL	—
PRV8-1	"	8	GEN EXH	2.3K	~1/2	"	INTERLOCK
PRV8-2	"	8	TOILET	380	~1/10	"	W/RM LITES
PRV9-1	"	9	ELECT REP.	8K	~3/4	"	SUMMER INTERLOCK
PRV9-2	"	9	TOILET	450	~1/10	"	W/RM LITES
PRV4-4	"	4	DYNO	1350	~1/6	"	(2 UNITS)
EF9-1	WALL	9	PHOTO RM	300	~1/10	"	—
PRV4-1	ROOF	4	DEGR. PIT	3.5K	~3/4	"	INTERLOCK
PRV4-2	"	4	GEN EXH	4.2K	~3/4	"	"
PRV4-3	"	4	EQP. ROOM	9.4K	~3/4	"	—
PRV7-1	"	7	SM ENG REP	1.6K	~1/10	"	INTERLOCK
PRV7-2	"	7	BATTERY RM	3.4K	~1	"	"
PRV7-3	"	7	DEGR PIT	1.4K	~1/2	"	—
PRV7-4	"	7	HOOD EXH	2K	~1/2	"	—
EF4-1	"	4	UTILITY FAN	38K	~2	"	—
PRV6-1	"	6	WELD SHOP	5K	~1	"	INTERLOCK
PRV6-2	"	6	RAD/MACH	3.55K	~3/4	"	"
PRV6-3	"	6	TOILET/LOCK.	1.96K	~1/2	"	"

FILM #: ________ FRAME #: ________

NOTES: TYPE --> propeller, centrifugal, etc.
STARTER & CONTROL --> momentary, maintained, line v stat, 24 v stat, self contained, etc.

Bldg No.: 8000 ZONE 3

MECHANICAL EQUIPMENT DATA

HEATING PLANT

T DESCRIPTION:
NUMBER OF UNITS: 3
MAKE & MODEL: 1) KEWANEE 131 HP/3601 MBH ✓
2) KEWANEE 131 HP/3601 MBH ✓
3) KEWANEE 79 HP/2653 MBH ✓
EQUIPMENT: ✓ BOILER ___ DIRECT FIRED ___ STEAM CONV
TYPE: ✓ STEAM ___ HW ___ CAST IRON ___ WATER TUBE, FIRE TUBE
FUEL: NAT GAS ✓ ELECTRIC _____ OIL _____ OTHER ________________

MULTIPLE UNIT OPERATION SEQUENCE:
SERIES #3 RUNS ALONE 9MOS/YR ~~#1~~ #1&#2 ALTERNATE REMAINING 3MOS.

BURNER STAGES: ____________________

FIRING RATE/FUEL: #1: NAG-5250/2653 ___ #2: 37.5 GPH ________

BURNER TYPE: ✓ POWER: MFR GORDON-PIATT ______ MOD No. DUAL FUEL ____
No's 1&2 ONLY BLOWER 480/3/60-6.9 A _____ HP @ _______ CFM
CONTRL 120/1/60-1.2 A
___ ATMOS: MFR ____________________ MOD No. ______________

___ HOT WATER: SUPPLY SIZE _______ TEMPERATURE _____ PRESSURE ____ PSI
RETURN SIZE _______ TEMPERATURE _____ PRESSURE ____ PSI
✓ STEAM: HEADER SIZE 10" TEMPERATURE _____ PRESSURE 6-10 PSI

TED CAPACITY: MAX BTUH IN #1&2-5250 MBH/#3-2653 MBH ____
MAX BTUH OUT ______________________

CONTROLS: TYPE ELECTRIC
CONDITION EXCELLENT

PLANT AUXILIARIES:
PUMPS: HW 1) ____/__/____-____A _________HP
2) ____/__/____-____A _________HP
COND 1) ____/__/____-____A _________HP
2) ____/__/____-____A _________HP

FANS: 1) ____/__/____-____A _________HP @ ________ CFM
2) ____/__/____-____A _________HP @ ________ CFM
3) ____/__/____-____A _________HP @ ________ CFM

OTHER 1) ____/__/____-____A _________HP
2) ____/__/____-____A _________HP

AUX OPERATING SCHEDULES:
PUMPS: HW 1) ON _____ OFF _____ 2) ON _____ OFF _____
COND 1) ON _____ OFF _____ 2) ON _____ OFF _____
FANS: 1) ON _____ OFF _____ 2) ON _____ OFF _____ 3) ON _____ OFF _____
OTHER: 1) ON _____ OFF _____ 2) ON _____ OFF _____

XILIARY FUEL USED: #2 OIL ✓ NAT GAS _____ OTHER ______

Bldg No.: 8000 ALL ZONES

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

OPERATING SCHEDULE: DATE STARTED CONTINUOUS
DATE STOPPED

	MON - FRI			SAT			SUN		
* PRESENT OPERATION:		TO			TO			TO	
* REQUIRED OPERATION:		TO			TO			TO	

OTHER PLANT COMMENTS: HIGH WIND SPEED CONDITIONS TEND TO BLOW BOILER PILOTS OUT. BOILERS HAVE EXCESSIVE CAPACITY, PERHAPS DOWN-SIZE @ CHANGE-OUT? STEAM TRAPS HAVE NOT BEEN SERVICED SINCE NEW, VALVES LEAK. CHANGE-OVER TO MTHW?

FILM #: FRAME #:

SKETCH:

* --> Disregard if the item is the same as the GENERAL BUILDING DATA.

Bldg No.: 8000-ALL ZONES

*** FMEA SURVEY OBSERVATIONS ***

3-17-93 OM

GENERAL BUILDING DATA

BLDG #: 8030 BLDG NAME: T.O. & E DIRECT SUPPORT JOB #: 124
SURVEYED BY: PK/WW DATE: ~~12-12-85~~ BLDG CONTACT:
CONTACT TELEPHONE NUMBER: X2019/5225 BLDG USAGE: MAINTENCE FACILITY
TOT BLDG AREA: 202,880 SF # OF FLOORS: ____ # OF PEOPLE: 190
2-ZONES

BUILDING OCCUPANCY: MON - FRI: ~~0700~~ TO ~~1700~~ FIRST SHIFT: _____
CONTINUOUS SATURDAY: — TO — SECOND SHIFT: _____
OPERATION 24 h/d. SUNDAY: — TO — THIRD SHIFT: _____
HOLIDAYS: — TO — HOLIDAYS: _____

ENVIRONMENTAL CONDITIONS:

(BOTH ZONES)	HEATING SETPOINTS WEEKDAYS DAY	NIGHT	WEEKENDS DAY	NIGHT	COOLING SETPOINTS WEEKDAYS DAY	NIGHT	WEEKENDS DAY	NIGHT
PRESENT T'STAT:	65°F	65°F	65°F	65°F	—	—	—	—
REQUIRED T'STAT:	55°F	55°F	55°F	55°F	—	—	—	—

THERMOSTAT LOCATION(S): EACH AREA
HUMIDIFICATION REQUIREMENTS (RH): — H'STAT LOCATION(S): —

LIGHTING:

ZN	AREA (SF)	LAMP TYPE	#LMPS	W/SF	SCHEDULE ON	OFF
1)	58160	FL/HPS (49,597W)	—	0.853		
2)	136,290	FL/HPS/INC (144,445W)	—	1.060		
3)						
4)						

DATA SOURCE: X OBSERVATION ___ASHRAE ___OTHER
SEE ATTACHED SCHEDULE? X Y ___N PP 5-9

ELECTRIC EQUIPMENT:

ZN	AREA (SF)	TYPE	(KW)	W/SF	SCHEDULE ON	OFF
1)	58,160	MOTORS, MISC	29.85	0.513		
2)	136,290	MOTORS, MISC	304.10	2.232		
3)						
4)						

DATA SOURCE: X OBSERVATION ___ASHRAE ___OTHER
SEE ATTACHED SCHEDULE? X Y ___N PP 10

INTERNAL MASS: MATERIAL: VEHICLES, EQUIP ESTIMATED MASS: _ (L, M, H)

INFILTRATION: LOCATION(S): OVERHEAD DOORS

ESTIMATED RATE: _____(L, M, H) or
_____AIR CHANGES or
_____CFM/LIN FT CRACK

ZONE 1
6016 ACFM DAY
2021 ACFM NITE

ZONE 2
20708 ACFM DAY
8157 ACFM NITE

*** FMEA SURVEY OBSERVATIONS ***

GENERAL BUILDING DATA

CONSTRUCTION:

WALLS:

CONSTRUCTION COMPONENT		WIDTH	HEIGHT	AREA (SF)	U-VALUE
A) MTL PNL/AIR SPC/INS MTL PNL	N :	300	22.67	6800	0.070
B) 8" CONC/RIG INS/4" CMU	E:	152	22.67	3445	0.074
C) INS MTL PNL/AIR SPC/INS MTL	S :	160	22.67	3627	0.071
PNL	W:	212	22.67	4720	0.070

ROOFS:

CONSTRUCTION COMPONENT		WIDTH	LENGTH	AREA (SF)	U-VALUE
BUILT UP ROOF/RIGID INS/MTL	1:	120	484.67	58,160	0.039
DECK	2:				
	3:				
	4:				

WINDOWS:

	AREA (SF)	TYPE			
N :	—		__ SP	__ DF	__ DRAPES
E:	—		__ SP	__ DF	__ DRAPES
S :	—		__ SP	__ DF	__ DRAPES
W:	—		__ SP	__ DF	__ DRAPES

FLOOR TYPE:
AREA: 58160 SF X SLAB __ CRAWL SPACE __ BASEMENT __ OTHER*
PERIM: 824 LF INSULATION: X Y __ N 2 IN ____________

SPECIAL AREAS: ____________

NOTES: ____________

FILM #: ________ FRAME #: ____________

SKETCHES:

*** FMEA SURVEY OBSERVATIONS ***

GENERAL BUILDING DATA

CONSTRUCTION:

WALLS:

CONSTRUCTION COMPONENT		WIDTH	HEIGHT	AREA (SF)	U-VALUE
A) MTL PNL/AIR SPC/INS MTL PNL	N:	800	34.61	27,426.1	0.075
B) 8" CONC/RIG INS/4" CMU	E:	376	29.93	11,253.2	0.077
C) INS MTL PNL/AIR SPC/INS	S:	940	33.65	31,568.5	0.074
MTL PNL	W:	316	31.31	9,893.2	0.076

ROOFS:

CONSTRUCTION COMPONENT		WIDTH	LENGTH	AREA (SF)	U-VALUE
BUILT UP ROOF/RIG INS/MTL DECK	1:	234.9	580	136,240	0.039
	2:				
	3:				
	4:				

WINDOWS:

	AREA (SF)	TYPE		SF		DF		DRAPES
N:	19.5	INSULATED	__	SF	X	DF	__	DRAPES
E:	—		__	SF	—	DF	__	DRAPES
S:	58.5		__	SF	X	DF	__	DRAPES
W:			__	SF	—	DF	__	DRAPES

FLOOR TYPE:
AREA: ___________SF __ SLAB __ CRAWL SPACE __ BASEMENT __ OTHER*
PERIM: ___________LF INSULATION: __Y __N ___IN ______________

SPECIAL AREAS: ____

NOTES: ____

FILM #:________FRAME #:________________________

SKETCHES:

__FMEA_SURVEY_OBSERVATIONS__

GENERAL BUILDING DATA

...ELLANEOUS BASE LOADS:
...STIC HOT WATER:
MANUFACTURER & MODEL UNKNOWN (SEE COMMENTS)
FUEL SOURCE ___ NAT GAS ___ ELEC ___ OIL ___ STM GEN X OTHER*
SUPPLY TEMPERATURE _____°F, DISTANCE FROM HEATER _____FT
INPUT ______ RECOVERY RATE _______ OPERATING SCHEDULE __________

EXTERIOR LIGHTING:
TYPE SEE SCHEDULES NO ___ SCHEDULE __________ CONTROL _________
TYPE _____________ NO ___ SCHEDULE __________ CONTROL _________
TOTAL KW __________
FUNCTION OF LIGHTS X SECURITY ___ PARKING LOT ___ ENTRY ___ OTHER*

ADDITIONAL COMMENTS: DHW GENERATED BY HTW CONVERTER, 100°F RISE, RECOVERY RATE UNKNOWN - ENERGY CONSUMED IS ESTIMATED AT 42,989 BTUH FOR BOTH ZONES.

FILM #: ______ FRAME #: ______________________________

ADDITIONAL SKETCHES:

*Specify in "Additional Comments"

Bldg No.: P-8030

*** FMEA SURVEY OBSERVATIONS ***

GENERAL BUILDING DATA

LIGHTING SCHEDULE ZONE 1

AREA: (A) MAIN 58,160 SF (B) MEZZ ____________ SF
(A) ________ X ________ (B) ________ X ________

DATA SOURCE: ___ DRAWINGS X SURVEY TOUR

Mark	#lamps	W/Fix	#Fix	Flr #	Comments
FL	154	77	77	A	AREA 'A' INTERIOR
FL	24	112	8	A	AREA 'A' INTERIOR
FL	66	77	33	A	AREA 'A' INTERIOR
HPS	3	305	3	A	AREA 'A' INTERIOR
HPS	20	465	20	A	AREA 'A' INTERIOR
HPS	6	95	6	A	AREA 'A' EXTERIOR
HPS	3	305	3	A	AREA 'A' EXTERIOR
FL	16	77	8	A	AREA 'B' INTERIOR
FL	16	48	16	A	AREA 'B' INTERIOR
HPS	45	305	45	A	AREA 'B' INTERIOR
HPS	1	465	1	A	AREA 'B' INTERIOR
HPS	4	305	4	A	AREA 'B' INTERIOR
HPS	1	465	1	A	AREA 'B' INTERIOR
HPS	1	95	1	A	AREA 'B' INTERIOR
HPS	1	95	1	A	AREA 'B' EXTERIOR

(A) TOTAL: ______________ Watts/ ________________ SF= ________ W/SF

(B) TOTAL: ______________ Watts/ ________________ SF= ________ W/SF

ADDITIONAL NOTES:

Bldg No.: P-8030 ZONE 1

*** FMEA SURVEY OBSERVATIONS ***

GENERAL BUILDING DATA

LIGHTING SCHEDULE ZONE 1

AREA: (A) MAIN 58,160 SF (B) MEZZ ____________ SF
(A) ________ X ________ (B) ________ X ________

DATA SOURCE: ___ DRAWINGS ___ SURVEY TOUR

Mark	#lamps	W/Fix	#Fix	Flr #	Comments
HPS	1	305	1	A	AREA 'B' EXTERIOR
HPS	40	305	40	A	AREA '1C' INTERIOR
HPS	1	95	1	A	AREA '1C' EXTERIOR
HPS	1	305	1	A	AREA '1C' EXTERIOR

(A) TOTAL: 49,597.1 Watts/ 58,160 SF= 0.853 W/SF

(B) TOTAL: ______________ Watts/ ________________ SF= ________ W/SF

ADDITIONAL NOTES:

EXTERIOR LIGHTS ARE NOT INCLUDED IN TOTAL WATTS FIGURES —

Bldg No.: P-8030

__FMEA_SURVEY_OBSERVATIONS__

GENERAL_BUILDING_DATA

LIGHTING SCHEDULE ZONE 2

AREA: (A)MAIN 136,240 SF (B)MEZZ ____________ SF
(A) ________X________ (B) ________X________

DATA SOURCE: ___DRAWINGS X SURVEY TOUR

Mark	#lamps	W/Fix	#Fix	Flr #	Comments
FL	136	77	68	A	AREA '2C' INTERIOR
FL	124	77	62	A	AREA '2C' INTERIOR
FL	30	112	10	A	AREA '2C' INTERIOR
FL	8	154	2	A	AREA '2C' INTERIOR
FL	2	77	1	A	AREA '2C' INTERIOR
HPS	30	465	30	A	AREA '2C' INTERIOR
HPS	2	305	2	A	AREA '2C' INTERIOR
HPS	3	305	3	A	AREA '2C' EXTERIOR
HPS	1	70	1	A	AREA '2C' EXTERIOR
FL	74	77	39	A	AREA 'D' INTERIOR
FL	24	112	8	A	AREA 'D' INTERIOR
HPS	29	465	29	A	AREA 'D' INTERIOR
HPS	18	1100	18	A	AREA 'D' INTERIOR
HPS	7	305	7	A	AREA 'D' EXTERIOR
FL	132	77	66	A	AREA 'E' INTERIOR

(A) TOTAL: ______________ Watts/ ________________ SF= ________ W/SF

(B) TOTAL: ______________ Watts/ ________________ SF= ________ W/SF

ADDITIONAL NOTES:

Bldg No.: P-8030 ZONE 2

*** FMEA SURVEY OBSERVATIONS ***

GENERAL BUILDING DATA

LIGHTING SCHEDULE ZONE 2

AREA: (A) MAIN 136,240 SF (B) MEZZ ____________ SF
(A) ________ X ________ (B) ________ X ________

DATA SOURCE: ___ DRAWINGS ___ SURVEY TOUR

Mark	#lamps	W/Fix	#Fix	Flr #	Comments
FL	7	48	7	A	AREA 'E' INTERIOR
FL	24	77	12	A	AREA 'E' INTERIOR
FL	6	81	3	A	AREA 'E' INTERIOR
FL	12	77	6	A	AREA 'E' INTERIOR
INC	1	200	1	A	AREA 'E' INTERIOR
HPS	24	465	24	A	AREA 'E' INTERIOR
HPS	2	305	2	A	AREA 'E' INTERIOR
HPS	8	1100	8	A	AREA 'E' INTERIOR
HPS	5	305	5	A	AREA 'E' EXTERIOR
FL	132	77	66	A	AREA 'F' INTERIOR
FL	7	48	7	A	AREA 'F' INTERIOR
FL	24	77	12	A	AREA 'F' INTERIOR
FL	6	81	3	A	AREA 'F' INTERIOR
FL	12	77	6	A	AREA 'F' INTERIOR
INC	1	200	1	A	AREA 'F' INTERIOR

(A) TOTAL: ______________ Watts/ ________________ SF= ________ W/SF

(B) TOTAL: ______________ Watts/ ________________ SF= ________ W/SF

ADDITIONAL NOTES:

*** FMEA SURVEY OBSERVATIONS ***

GENERAL BUILDING DATA

LIGHTING SCHEDULE ZONE 2

AREA: (A) MAIN 136,240 SF (B) MEZZ ______________ SF
(A) ________ X ________ (B) ________ X ________

DATA SOURCE: ___ DRAWINGS ___ SURVEY TOUR

Mark	#lamps	W/Fix	#Fix	Flr #	Comments
HPS	24	465	24	A	AREA 'F' INTERIOR
HPS	2	305	2	A	AREA 'F' INTERIOR
HPS	8	1100	8	A	AREA 'F' INTERIOR
HPS	5	305	5	A	AREA 'F' EXTERIOR
FL	122	77	61	A	AREA 'G' INTERIOR
FL	36	77	18	A	AREA 'G' INTERIOR
FL	6	81	3	A	AREA 'G' INTERIOR
INC	1	200	1	A	AREA 'G' INTERIOR
HPS	22	465	22	A	AREA 'G' INTERIOR
HPS	8	1100	8	A	AREA 'G' INTERIOR
HPS	9	305	9	A	AREA 'G' EXTERIOR

(A) TOTAL: 144,453 Watts/ 136,240 SF= 1.06 W/SF

(B) TOTAL: ______________ Watts/ ________________ SF= ________ W/SF

ADDITIONAL NOTES:

EXTERIOR LIGHTS ARE NOT INCLUDED IN TOTAL WATTS FIGURES —

*** FMEA SURVEY OBSERVATIONS ***

GENERAL BUILDING DATA

AREA: 202,880 SF (A) MAIN 58,160 SF (B) MEZZ 136,240 SF

(A) ________ X ________ (B) ________ X ________

ELECTRICAL EQUIPMENT:

QTY	KW	DESCRIPTION	COMMENTS
1	5.6	7.5 HP HV FAN ZONE 1	
2	22.4	15 HP HV FAN ZONE 1	
1	0.746	1 HP UH FAN ZONE 1	COMPOSITE FIGURE
4	74.6	25 HP HV FAN ZONE 2	
2	44.7	30 HP HV FAN ZONE 2	
6	179.0	40 HP HV FAN ZONE 2	

(A) TOTAL: 29,850 Watts/ 58,160 SF= 0.513 W/SF

(B) TOTAL: 304,102.8 Watts/ 136,240 SF= 2.232 W/SF

Bldg No.: P-8030 Zone No.: 1 & 2 Page 10 of 15

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

AIR HANDLING UNITS:
MANUFACTURER McQUAY MODEL No. ______
AHU NUMBER: HVU-1 AHU TYPE: SZU
LOCATION: MEZZANINE SPACE SERVED: AREA 1

FAN DATA:
SUPPLY FAN HP: 7.5 SUPPLY CFM: 8000 STATIC PRESS: ~1.5" W.C.
RETURN FAN HP: — RETURN CFM: — STATIC PRESS: ___
EXHAUST FAN HP: — EXHAUST CFM: — STATIC PRESS: ___
MOTOR STARTER: MNT __ MOM __. SWITCH: P.B. __ H.O.A. X DISCON __

COILS: 3/4" HW 3-way valve.
HEATING: HW X STM __ DIRECT FIRED --> NG __ OIL __ ELC __ OTHER __
~~COOLING:~~ CW — DX __. FROM CHILLER ______, FROM DX UNIT ______
~~REHEAT:~~ # OF COILS — TYPE ______. RECOOL: # OF COILS ___ TYPE ___
~~HUMIDITY:~~ STM — SPRAY __ ELC __. HW/CW COIL VALVES: 2 WAY __, 3 WAY __

DAMPERS:
O.A. DAMPER: __ (Y N), IF YES, FIXED __%, MODULATING __% TO __%
R.A. DAMPER: __ (Y N), IF YES, FIXED __%, MODULATING __% TO __%
E.A. DAMPER: __ (Y N), IF YES, FIXED __%, MODULATING __% TO __%
ECONOMIZER: __ (Y, N) IF YES, OA __ RA __ ENTHALPY __
OA LEAKAGE: ______% IF NO, CAN ECONOMIZER BE ADDED Y

FILTER CONDITION: X GOOD ___ FAIR ___ POOR

SYSTEM OPERATION: MON - FRI SAT SUN
*PRESENT OPERATION: ______ TO ______ ______ TO ______ ______ TO ______
*REQUIRED OPERATION: ______ TO ______ ______ TO ______ ______ TO ______

	HEATING SETPOINTS				COOLING SETPOINTS			
	WEEKDAYS		WEEKENDS		WEEKDAYS		WEEKENDS	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
*PRESENT TEMP:								
*REQUIRED TMP:								

HUMIDIFICATION REQUIREMENTS (RH): ____ HUMIDISTAT LOCATION: ____

SYSTEM SETPOINTS: MIXED AIR ___°F, HOT DECK ___°F, COLD DECK ___°F
TIME CLOCK: ___ (Y N), IF YES, IS IT OPERATIONAL ___ (Y, N)

CONTROLS: PNEUMATIC ✓, ELECTRIC ______, PNEUMATIC/ELEC ______

EQUIPMENT CONDITION: EXCELLENT(E), GOOD(G), POOR(P) T'STAT G
H'STAT — COMPR — DAMPERS G LINKAGES G FANS G SHEAVES G
VALVES G ACTUATORS G BELTS G MIXING BOX G
OTHER ___

AV5

COMMENTS: UNIT NOT RUNNING AT TIME OF SURVEY — missing
Heat Wheel (chain is off) disabled; R.A. Damper (prev. disconnected) disabled - wired open; 2"- 3 way HW C.V. prev. disconn.
Reheat Coils present. O.A. control (ON/OFF switch) on Heat Wheel.

__FMEA_SURVEY_OBSERVATIONS__

MECHANICAL_EQUIPMENT_DATA

HANDLING UNITS:
ANUFACTURER ____________________ MODEL No. ____________________
AHU NUMBER: HVU2 AHU TYPE: SZU DRAW THRU
LOCATION: ____________________ SPACE SERVED: ____________________

FAN DATA:
SUPPLY FAN HP: 15 SUPPLY CFM: 19,150 STATIC PRESS: 3.0" W.C.
RETURN FAN HP: — RETURN CFM: — STATIC PRESS: —
EXHAUST FAN HP: 15 EXHAUST CFM: 19,150 STATIC PRESS: 3.0" W.C.
MOTOR STARTER: MNT __ MOM __. SWITCH: P.B. __ H.O.A. X DISCON __

COILS: 1¼" 3 WAY
HEATING: HW X STM __ DIRECT FIRED --> NG __ OIL __ ELC__ OTHER __
~~COOLING~~: CW __ DX __. FROM CHILLER __________, FROM DX UNIT _______
~~REHEAT~~: # OF COILS ___ TYPE _____. RECOOL: # OF COILS ___ TYPE ____
~~HUMIDITY~~: STM __ SPRAY __ ELC __. HW/CW COIL VALVES: 2 WAY __, 3 WAY __

DAMPERS:
O.A. DAMPER: __ (Y, N), IF YES, FIXED __%, MODULATING __% TO __%
R.A. DAMPER: __ (Y, N), IF YES, FIXED __%, MODULATING __% TO __%
E.A. DAMPER: __ (Y, N), IF YES, FIXED __%, MODULATING __% TO __%
ECONOMIZER: __ (Y, N), IF YES, OA X RA __ ENTHALPY __
OA LEAKAGE: 5 % IF NO, CAN ECONOMIZER BE ADDED _________

FILTER CONDITION: ___GOOD X FAIR ___POOR

TEM OPERATION:	MON - FRI	SAT	SUN
*PRESENT OPERATION:	______ TO ______	______ TO ______	______ TO ______
*REQUIRED OPERATION:	______ TO ______	______ TO ______	______ TO ______

	HEATING SETPOINTS				COOLING SETPOINTS			
	WEEKDAYS		WEEKENDS		WEEKDAYS		WEEKENDS	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
*PRESENT TEMP:								
*REQUIRED TMP:								

HUMIDIFICATION REQUIREMENTS (RH): ____ HUMIDISTAT LOCATION: _____

SYSTEM SETPOINTS: MIXED AIR ___°F, HOT DECK ___°F, COLD DECK ___°F
TIME CLOCK: ___ (Y, N), IF YES, IS IT OPERATIONAL ___ (Y, N)

CONTROLS: PNEUMATIC X, ELECTRIC ______, PNEUMATIC/ELEC ______

EQUIPMENT CONDITION: EXCELLENT(E), GOOD(G), POOR(P) T'STAT —
H'STAT — COMPR — DAMPERS G LINKAGES G FANS G SHEAVES G
VALVES G ACTUATORS G BELTS G MIXING BOX G
OTHER ___

COMMENTS: 1¼" 3-Way Valve on HW

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

AIR HANDLING UNITS:
MANUFACTURER ________________________ MODEL No. ____________________
AHU NUMBER: HV3/4A AHU TYPE: SZU DRAW THRU
LOCATION: MEZZANINE ________ SPACE SERVED: ____________________

FAN DATA:
SUPPLY FAN HP: 25 SUPPLY CFM: 31.9K STATIC PRESS: 3.0"WC
RETURN FAN HP: — RETURN CFM: — STATIC PRESS: —
EXHAUST FAN HP: 25 EXHAUST CFM: 31.9k STATIC PRESS: 3.0"W.C
MOTOR STARTER: MNT __ MOM __. SWITCH: P.B. __ H.O.A. X DISCON __

COILS:
2" HEATING: HW X 3-WAY STM __ D~~IRECT FIRED~~ --> NG __ OIL __ ELC __ OTHER __
~~COOLING:~~ CW __ DX __. FROM CHILLER _________, FROM DX UNIT _______
~~REHEAT:~~ # OF COILS ___ TYPE _____. RECOOL: # OF COILS ___ TYPE ____
~~HUMIDITY~~: STM __ SPRAY __ ELC __. HW/CW COIL VALVES: 2 WAY __, 3 WAY __

DAMPERS:
O.A. DAMPER: __ (Y, N), IF YES, FIXED __%, MODULATING __% TO __%
R.A. DAMPER: __ (Y, N), IF YES, FIXED __%, MODULATING __% TO __%
E.A. DAMPER: __ (Y, N), IF YES, FIXED __%, MODULATING __% TO __%
ECONOMIZER: __ (Y, N), IF YES, OA X RA __ ENTHALPY __
OA LEAKAGE: __5___% IF NO, CAN ECONOMIZER BE ADDED _________

FILTER CONDITION: ___GOOD X FAIR ___POOR

SYSTEM OPERATION:

	MON - FRI			SAT			SUN		
*PRESENT OPERATION:	______	TO	______	______	TO	______	______	TO	______
*REQUIRED OPERATION:	______	TO	______	______	TO	______	______	TO	______

	HEATING SETPOINTS				COOLING SETPOINTS			
	WEEKDAYS		WEEKENDS		WEEKDAYS		WEEKENDS	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
*PRESENT TEMP:								
*REQUIRED TMP:								

HUMIDIFICATION REQUIREMENTS (RH): ____ HUMIDISTAT LOCATION: _____

SYSTEM SETPOINTS: MIXED AIR ___°F, HOT DECK ___°F, COLD DECK ___°F
TIME CLOCK: ___ (Y, N), IF YES, IS IT OPERATIONAL ___ (Y, N)

CONTROLS: PNEUMATIC X, ELECTRIC ______, PNEUMATIC/ELEC ______

EQUIPMENT CONDITION: EXCELLENT(E), GOOD(G), POOR(P) T'STAT G
H'STAT — COMPR — DAMPERS G LINKAGES G FANS G SHEAVES G
VALVES G ACTUATORS G BELTS G MIXING BOX G
OTHER___

COMMENTS: ____

____

____

Bldg No.: P8030

__FMEA SURVEY OBSERVATIONS__

MECHANICAL EQUIPMENT DATA

HANDLING UNITS:
ANUFACTURER ______________________ MODEL No. ______________
AHU NUMBER: HV4B AHU TYPE: S?U DRAW THRU ______________
LOCATION: MEZZANINE ________ SPACE SERVED: ______________

FAN DATA:
SUPPLY FAN HP: 30 ✓ SUPPLY CFM: 38.3K STATIC PRESS: 3.0
RETURN FAN HP: — RETURN CFM: — STATIC PRESS: —
EXHAUST FAN HP: 30 EXHAUST CFM: 38.3K STATIC PRESS: 3.0
MOTOR STARTER: MNT __ MOM __. SWITCH: P.B. __ H.O.A. X DISCON __

COILS: 2 1/4-3WAY
HEATING: HW X STM __ ~~DIRECT FIRED~~ --> NG __ OIL __ ELC__ OTHER __
~~COOLING~~: CW __ DX __. FROM CHILLER ________, FROM DX UNIT ______
~~REHEAT~~: # OF COILS ___ TYPE _____. RECOOL: # OF COILS ___ TYPE ____
~~HUMIDI~~TY: STM __ SPRAY __ ELC __. HW/CW COIL VALVES: 2 WAY __, 3 WAY __

DAMPERS:
O.A. DAMPER: __ (Y, N), IF YES, FIXED __%, MODULATING __% TO __%
R.A. DAMPER: __ (Y, N), IF YES, FIXED __%, MODULATING __% TO __%
E.A. DAMPER: __ (Y, N), IF YES, FIXED __%, MODULATING __% TO __%
ECONOMIZER: __ (Y, N), IF YES, OA X RA __ ENTHALPY __
OA LEAKAGE: __5__% IF NO, CAN ECONOMIZER BE ADDED ________

FILTER CONDITION: ___GOOD X FAIR ___POOR

SYSTEM OPERATION: MON - FRI SAT SUN
*PRESENT OPERATION: _____ TO _____ _____ TO _____ _____ TO _____
*REQUIRED OPERATION: _____ TO _____ _____ TO _____ _____ TO _____

	HEATING SETPOINTS				COOLING SETPOINTS			
	WEEKDAYS		WEEKENDS		WEEKDAYS		WEEKENDS	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
*PRESENT TEMP:								
*REQUIRED TMP:								

HUMIDIFICATION REQUIREMENTS (RH): ____ HUMIDISTAT LOCATION: _____

SYSTEM SETPOINTS: MIXED AIR ___°F, HOT DECK ___°F, COLD DECK ___°F
TIME CLOCK: ___ (Y, N), IF YES, IS IT OPERATIONAL ___ (Y, N)

CONTROLS: PNEUMATIC X, ELECTRIC ______, PNEUMATIC/ELEC ______

EQUIPMENT CONDITION: EXCELLENT(E), GOOD(G), POOR(P) T'STAT G
H'STAT — COMPR — DAMPERS G LINKAGES G FANS G SHEAVES G
VALVES G ACTUATORS G BELTS G MIXING BOX G
OTHER ___

COMMENTS: ____

Bldg No.: P-80300

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

AIR HANDLING UNITS:
MANUFACTURER ✓✓✓ MODEL No. ____
AHU NUMBER: HV5/6/7 AHU TYPE: SZU DRAW THRU
LOCATION: MEZZANINE ____ SPACE SERVED: ____

FAN DATA:
SUPPLY FAN HP: 40 ✓ SUPPLY CFM: 51K STATIC PRESS: 3.0
RETURN FAN HP: — RETURN CFM: — STATIC PRESS: —
EXHAUST FAN HP: 40 ✓ EXHAUST CFM: 51K STATIC PRESS: 3.0
MOTOR STARTER: MNT __ MOM __. SWITCH: P.B. __ H.O.A. X DISCON __

COILS: 2" 3 WAY VALVE - PNEUMATIC TUBE DISCONNECTED ON HU 5 & 6
HEATING: HW X STM __ ~~DIRECT FIRED~~ --> NG __ OIL __ ELC__ OTHER __
~~COOLING~~: CW __ DX __. FROM CHILLER ____, FROM DX UNIT ____
~~REHEAT~~: # OF COILS ___ TYPE _____. RECOOL: # OF COILS ___ TYPE ____
~~HUMIDITY~~: STM __ SPRAY __ ELC __. HW/CW COIL VALVES: 2 WAY __, 3 WAY __

DAMPERS:
O.A. DAMPER: __ (Y, N), IF YES, FIXED __%, MODULATING __% TO __%
R.A. DAMPER: __ (Y, N), IF YES, FIXED __%, MODULATING __% TO __%
E.A. DAMPER: __ (Y, N), IF YES, FIXED __%, MODULATING __% TO __%
ECONOMIZER: __ (Y, N), IF YES, OA X RA __ ENTHALPY __
OA LEAKAGE: 5 ___% IF NO, CAN ECONOMIZER BE ADDED ____

FILTER CONDITION: ___GOOD X FAIR ___POOR

SYSTEM OPERATION: MON - FRI SAT SUN
*PRESENT OPERATION: ____ TO ____ ____ TO ____ ____ TO ____
*REQUIRED OPERATION: ____ TO ____ ____ TO ____ ____ TO ____

	HEATING SETPOINTS				COOLING SETPOINTS			
	WEEKDAYS		WEEKENDS		WEEKDAYS		WEEKENDS	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
*PRESENT TEMP:								
*REQUIRED TMP:								

HUMIDIFICATION REQUIREMENTS (RH): ____ HUMIDISTAT LOCATION: ____

SYSTEM SETPOINTS: MIXED AIR ___°F, HOT DECK ___°F, COLD DECK ___°F
TIME CLOCK: ___ (Y, N), IF YES, IS IT OPERATIONAL ___ (Y, N)

CONTROLS: PNEUMATIC X___, ELECTRIC ____, PNEUMATIC/ELEC ____

EQUIPMENT CONDITION: EXCELLENT(E), GOOD(G), POOR(P) T'STAT G
H'STAT — COMPR — DAMPERS G LINKAGES G FANS G SHEAVES G
VALVES G ACTUATORS G BELTS G MIXING BOX G
OTHER ___ HV6 also.

COMMENTS: HV7 - Heat Wheel chain disconnected, R.A. damper actuator disconnected. Fixed in open position. O.A. control on Heat Wheel. 2' Pneumatic line to Mixing Value on HW coil is disconnected.

HU5 & 7 SUPPLY FAN NAMPLATE IS MISSING

Bldg No.: P8030

*** FMEA SURVEY OBSERVATIONS ***

3-17-~~93~~ 93 PM

GENERAL BUILDING DATA

BLDG #: P8142 BLDG NAME: D/S MAINTENANCE FACILITY JOB #: 124
SURVEYED BY: PK DATE: ~~12-13-84~~ BLDG CONTACT: SFC WEBBER
CONTACT TELEPHONE NUMBER: X5760/5904 BLDG USAGE: VEHICLE REPAIR
TOT BLDG AREA: 95,172 SF # OF FLOORS: 1 # OF PEOPLE: 120
4 ZONES

BUILDING OCCUPANCY:					
MON - FRI:	0700	TO	1630	FIRST SHIFT:	_____
SATURDAY:	____	TO	____	SECND SHIFT:	_____
SUNDAY:	____	TO	____	THIRD SHIFT:	_____
HOLIDAYS:	____	TO	____	HOLIDAYS:	_____

ENVIRONMENTAL CONDITIONS:

	HEATING SETPOINTS				COOLING SETPOINTS			
	WEEKDAYS		WEEKENDS		WEEKDAYS		WEEKENDS	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
PRESENT T'STAT:	SEE NOTES							
REQUIRED T'STAT:								

THERMOSTAT LOCATION(S): ____________
HUMIDIFICATION REQUIREMENTS (RH): ____ H'STAT LOCATION(S): ________

LIGHTING:

ZN	AREA(SF)	LAMP TYPE		#LMPS	W/SF	SCHEDULE ON	OFF
1)	20,376	HPS/FL	25,527	60	1.25		
2)	7,824	FL	10,824	246	1.38		
3)	10,396	FL	7,484	166	0.72		
4)	6,576	FL	7,822	178	1.19		

DATA SOURCE: X OBSERVATION ___ASHRAE ___OTHER
SEE ATTACHED SCHEDULE? ___Y X N

ELECTRIC EQUIPMENT:

ZN	AREA(SF)	TYPE	(KW)	W/SF	SCHEDULE ON	OFF
1)	20,376	MOTORS (33 HP)	24.6	1.21		
2)	7,824	MOTORS (9.25 HP)	6.9	0.88		
3)	10,396	MOTORS (11 HP)	8.2	0.79		
4)	6,576	MOTORS (9.6 HP)	7.2	1.09		

DATA SOURCE: X OBSERVATION ___ASHRAE ___OTHER
SEE ATTACHED SCHEDULE? ___Y X N

INTERNAL MASS: MATERIAL: VEHICLES, EQUIP ESTIMATED MASS: _ (L, M, H)

INFILTRATION: LOCATION(S): ____________

ESTIMATED RATE: _____(L, M, H) or
_____AIR CHANGES or
_____CFM/LIN FT CRACK

ZONE 1	ZONE 2	ZONE 3	ZONE 4
3953 ACFM DAY	65 ACFM DAY	690 ACFM DAY	68 ACFM DAY
2649 ACFM NITE	65 ACFM NITE	690 ACFM NITE	68 ACFM NITE

*** FMEA SURVEY OBSERVATIONS ***

GENERAL BUILDING DATA

CONSTRUCTION:

WALLS:

CONSTRUCTION COMPONENT		WIDTH	HEIGHT	AREA (SF)	U-VALUE
A.) 4"CMU/2" RIGINS/8"CMU	N:	114.0	39.0	4440.0	0.09
B.) MTL PNL/3" RIGINS/MTL PNL	E:	236.67	39.0	9230.0	0.09
	S:	184.15	39.0	7182.0	0.09
	W:	169.0	38.0	6422.0	0.09

ROOFS:

CONSTRUCTION COMPONENT		WIDTH	LENGTH	AREA (SF)	U-VALUE
BUILT UP ROOF/3" RIGINS/ MTL DECK	1:	120.57	169	20,376	0.09
	2:				
	3:				
	4:				

WINDOWS:

	AREA (SF)	TYPE	SP	DP	DRAPES
N:	6.0		X		
E:	12.0		X		
S:	12.0		X		
W:	6.0		X		

FLOOR TYPE:

AREA: ______ SF X SLAB __ CRAWL SPACE __ BASEMENT __ OTHER*

PERIM: 710 LF INSULATION: X Y __ N 2 IN RIGID TO 24"

SPECIAL AREAS:

NOTES: TEMPERATURES BY ZONES:

	ZONE 1	ZONE 2	ZONE 3	ZONE 4
PRESENT:	65°F/55°F	70°F/60°F	65°F/65°F	70°F/60°F
REQ'D:	55°F/55°F	65°F/55°F	55°F/55°F	65°F/55°F

FILM #: ________ FRAME #:

SKETCHES:

__FMEA_SURVEY_OBSERVATIONS__

GENERAL_BUILDING_DATA

CONSTRUCTION:

WALLS:

CONSTRUCTION COMPONENT		WIDTH	HEIGHT	AREA (SF)	U-VALUE
A) 4"CMU/2" RIGINS/8"CMU	N :	202.96	10.0	2029.6	0.09
B) MTL PNL/3" RIGINS/MTL PNL	E:	—	—	—	—
	S :	28.0	17.33	485.3	0.09
	W:	102.56	15.25	1564.0	0.09

ROOFS:

CONSTRUCTION COMPONENT		WIDTH	LENGTH	AREA (SF)	U-VALUE
BUILT UP ROOF/3" RIGINS/	1:	70.20	102.56	7200	0.09
MTL DECK/AIR SPC/ACOUST	2:				
SUSP CEILING	3:				
	4:				

WINDOWS:

	AREA (SF)	TYPE	SP	DP	DRAPES
N :	—		—		
E:	—		—		
S :	36.0		X		
W:	48.0		X		

FLOOR TYPE:

AREA: 7824 SF __ SLAB __ CRAWL SPACE __ BASEMENT X OTHER*

PERIM: — LF INSULATION: __Y __N ___IN ____________

SPECIAL AREAS: ______________________________

NOTES: * 2ND FLOOR OFFICES —

FILM #: ________ FRAME #: ______________________

SKETCHES:

*** FMEA SURVEY OBSERVATIONS ***

GENERAL BUILDING DATA

CONSTRUCTION:

WALLS:

CONSTRUCTION COMPONENT		WIDTH	HEIGHT	AREA (SF)	U-VALUE
A) 4" CMU/2" RIGINS/8" CMU	N:	92.0	13.0	1196.0	0.09
B) MTL PNL/3" RIGINS/MTL PNL	E:	113.0	16.0	1808.0	0.09
	S:	—	—	—	—
	W:	113.0	16.0	1808.0	0.09

ROOFS:

CONSTRUCTION COMPONENT		WIDTH	LENGTH	AREA (SF)	U-VALUE
BUILT UP ROOF/3" RIGINS/MTL DECK	1:	92	113	10,396	0.09
	2:				
	3:				
	4:				

WINDOWS:

	AREA (SF)	TYPE	SP	DP	DRAPES
N:	—		—		
E:	18.0		X		
S:	—		—		
W:	12.0		X		

FLOOR TYPE:

AREA: 10396 SF X SLAB __ CRAWL SPACE __ BASEMENT __ OTHER*

PERIM: 318 LF INSULATION: X Y __ N 2 IN RIGID TO 24"

SPECIAL AREAS: ____

NOTES: ____

FILM #: ____ FRAME #: ____

SKETCHES:

*** FMEA SURVEY OBSERVATIONS ***

GENERAL BUILDING DATA

CONSTRUCTION:

WALLS:

CONSTRUCTION COMPONENT		WIDTH	HEIGHT	AREA (SF)	U-VALUE
A.) 4"CMU/2"RIGINS/8"CMU	N :	8.0	13.17	105.3	0.09
B.) MTL PNL/3" RIGINS/MTL	E:	—	—	—	—
PNL	S :	28.0	13.17	368.7	0.09
	W:	48.0	13.17	632.0	0.09

ROOFS:

CONSTRUCTION COMPONENT		WIDTH	LENGTH	AREA (SF)	U-VALUE
NO ROOF	1:	—	—	—	—
	2:				
	3:				
	4:				

WINDOWS:

	AREA (SF)	TYPE	SP	DP	DRAPES
N :	—		—		
E:	—		—		
S :	6.0		X		
W:	12.0		X		

FLOOR TYPE:

AREA: 6576.0 SF __ SLAB __ CRAWL SPACE __ BASEMENT __ OTHER*

PERIM: 48.0 LF INSULATION: X Y __ N 2 IN RIGID TO 24"

SPECIAL AREAS:

NOTES:

FILM #: ________ FRAME #: ________

SKETCHES:

*** FMEA SURVEY OBSERVATIONS ***

GENERAL BUILDING DATA

MISCELLANEOUS BASE LOADS:
DOMESTIC HOT WATER:
MANUFACTURER & MODEL UNKNOWN
FUEL SOURCE ___ NAT GAS ___ ELEC ___ OIL ___ STM GEN X OTHER*
SUPPLY TEMPERATURE 112 °F, DISTANCE FROM HEATER _____ FT
INPUT ______ RECOVERY RATE _______ OPERATING SCHEDULE ___________

EXTERIOR LIGHTING:
TYPE ______________ NO ___ SCHEDULE ___________ CONTROL _________
TYPE ______________ NO ___ SCHEDULE ___________ CONTROL _________
TOTAL KW __________
FUNCTION OF LIGHTS ___ SECURITY ___ PARKING LOT ___ ENTRY ___ OTHER*

ADDITIONAL COMMENTS: DHW SUPPLIED BY HTW CONVERTER

FILM #: ______ FRAME #: ______________

ADDITIONAL SKETCHES:

Chilled Water pump - 2 HP Baldor Hi Efficiency. for MZ 1
Hot " " - 7.5HP Gould. for Bldg.

* Specify in "Additional Comments"

Bldg No.: P-8142

__FMEA_SURVEY_OBSERVATIONS__

MECHANICAL_EQUIPMENT_DATA

AIR HANDLING UNITS:
MANUFACTURER ~~UNKNOWN~~ TRANE MODEL No. CCBB10GEE30
AHU NUMBER: MZ1 AHU TYPE: MULTI ZONE DRAW THRU
LOCATION: ____________________ SPACE SERVED: ____________________

FAN DATA:
SUPPLY FAN HP: 7½ SUPPLY CFM: 47600* STATIC PRESS: .25*
RETURN FAN HP: 1½ RETURN CFM: 9525* STATIC PRESS: .25*
EXHAUST FAN HP: 1/4 EXHAUST CFM: 1580* STATIC PRESS: .25*
MOTOR STARTER: MNT __ MOM __. SWITCH: P.B. __ H.O.A. X DISCON __

COILS:
½" 3-WAY HEATING: X HW X STM __ DIRECT FIRED --> NG __ OIL __ ELC __ OTHER __
1½" 3-WAY COOLING: ✓ CW X DX __. FROM CHILLER CENTRAL, FROM DX UNIT _______
~~REHEAT:~~ # OF COILS ___ TYPE _____. RECOOL: # OF COILS ___ TYPE ____
~~HUMIDITY:~~ STM __ SPRAY __ ELC __. HW/CW COIL VALVES: 2 WAY __, 3 WAY __

DAMPERS:
O.A. DAMPER: __ (Y N), IF YES, FIXED __%, MODULATING __% TO __%
R.A. DAMPER: __ (Y N), IF YES, FIXED __%, MODULATING __% TO __%
E.A. DAMPER: __ (Y N), IF YES, FIXED __%, MODULATING __% TO __%
ECONOMIZER: __ (Y, N), IF YES, OA __ RA __ ENTHALPY __
OA LEAKAGE: _______% IF NO, CAN ECONOMIZER BE ADDED _________

FILTER CONDITION: ___GOOD X FAIR ___POOR

SYSTEM OPERATION:	MON - FRI		SAT		SUN	
*PRESENT OPERATION:	______ TO	______	_____ TO	______	_____ TO	_____
*REQUIRED OPERATION:	_____ TO	______	_____ TO	______	_____ TO	_____

	HEATING SETPOINTS				COOLING SETPOINTS			
	WEEKDAYS		WEEKENDS		WEEKDAYS		WEEKENDS	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
*PRESENT TEMP:	_____	_____	_____	_____	_____	_____	_____	_____
*REQUIRED TMP:	_____	_____	_____	_____	_____	_____	_____	_____

HUMIDIFICATION REQUIREMENTS (RH): ____ HUMIDISTAT LOCATION: _____

SYSTEM SETPOINTS: MIXED AIR ___°F, HOT DECK ___°F, COLD DECK ___°F
TIME CLOCK: ___ (Y N), IF YES, IS IT OPERATIONAL ___ (Y, N)

CONTROLS: PNEUMATIC X___, ELECTRIC ______, PNEUMATIC/ELEC ______

EQUIPMENT CONDITION: EXCELLENT(E), GOOD(G), POOR(P) T'STAT G
H'STAT ___ COMPR ___ DAMPERS G LINKAGES G FANS G SHEAVES G
VALVES G ACTUATORS G BELTS G MIXING BOX G
OTHER___

COMMENTS: * = ESTIMATED
4 Zones, 1½" 3-Way C.V. on CW, ½" HW 3-Way Valve. ✓

Bldg No. P 8142

__FMEA_SURVEY_OBSERVATIONS__

MECHANICAL_EQUIPMENT_DATA

AIR HANDLING UNITS:
MANUFACTURER UNKNOWN __________ MODEL No. ____________
AHU NUMBER: HV-1 AHU TYPE: HORIZONTAL DRAW THRU __________
LOCATION: CEILING __________ SPACE SERVED: AREA 'D' __________

FAN DATA:
SUPPLY FAN HP: 7 1/2 ✓ SUPPLY CFM: 47625 * STATIC PRESS: *.25
RETURN FAN HP: 2 1/2 ✓ RETURN CFM: 15,815 * STATIC PRESS: *.25
EXHAUST FAN HP: 1/4 EXHAUST CFM: 1,580 * STATIC PRESS: *.25
MOTOR STARTER: MNT __ MOM __. SWITCH: P.B. __ H.O.A. X DISCON __

COILS:
HEATING: ✓HW X STM __ DIRECT FIRED --> NG __ OIL __ ELC__ OTHER __
~~COOLING~~: CW __ DX __. FROM CHILLER __________, FROM DX UNIT ________
REHEAT: # OF COILS ___ TYPE _____. RECOOL: # OF COILS ___ TYPE ____
HUMIDITY: STM __ SPRAY __ ELC __. HW/CW COIL VALVES: 2 WAY __, 3 WAY __

DAMPERS:
O.A. DAMPER: __ (Y, N), IF YES, FIXED __%, MODULATING __% TO __%
R.A. DAMPER: __ (Y, N), IF YES, FIXED __%, MODULATING __% TO __%
E.A. DAMPER: __ (Y, N), IF YES, FIXED __%, MODULATING __% TO __%
ECONOMIZER: __ (Y, N) IF YES, OA __ RA __ ENTHALPY __
OA LEAKAGE: _______% IF NO, CAN ECONOMIZER BE ADDED _________

FILTER CONDITION: ___GOOD X FAIR ___POOR

SYSTEM OPERATION: MON - FRI SAT SUN
*PRESENT OPERATION: ______ TO _____ _____ TO _____ _____ TO _____
*REQUIRED OPERATION: _____ TO _____ _____ TO _____ _____ TO _____

	HEATING SETPOINTS				COOLING SETPOINTS			
	WEEKDAYS		WEEKENDS		WEEKDAYS		WEEKENDS	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
*PRESENT TEMP:	_____	_____	_____	_____	_____	_____	_____	_____
*REQUIRED TMP:	_____	_____	_____	_____	_____	_____	_____	_____

HUMIDIFICATION REQUIREMENTS (RH): ____ HUMIDISTAT LOCATION: _____

SYSTEM SETPOINTS: MIXED AIR ___°F, HOT DECK ___°F, COLD DECK ___°F
TIME CLOCK: ___ (Y, N), IF YES, IS IT OPERATIONAL ___ (Y, N)

CONTROLS: PNEUMATIC ✓____, ELECTRIC ______, PNEUMATIC/ELEC ______

EQUIPMENT CONDITION: EXCELLENT(E), GOOD(G), POOR(P) T'STAT ___
H'STAT ___ COMPR ___ DAMPERS ___ LINKAGES ___ FANS ___ SHEAVES ___
VALVES ___ ACTUATORS ___ BELTS ___ MIXING BOX ___
OTHER___

COMMENTS: * = ESTIMATED
1" HW 3-Way C.V. pneumatic.

__FMEA_SURVEY_OBSERVATIONS__

MECHANICAL_EQUIPMENT_DATA

AIR HANDLING UNITS:
MANUFACTURER ______________________ MODEL No. ____________________
AHU NUMBER: MU6 AHU TYPE: MAKE UP AIR UNIT______________
LOCATION: MER______________ SPACE SERVED: __________________

FAN DATA:
SUPPLY FAN HP: 1 1/2 SUPPLY CFM: 3525 STATIC PRESS: *.25
RETURN FAN HP: — RETURN CFM: — STATIC PRESS: —
EXHAUST FAN HP: 1/2 EXHAUST CFM: 3175 STATIC PRESS: *.25
MOTOR STARTER: MNT __ MOM __. SWITCH: P.B. __ H.O.A. __ DISCON __

COILS: MARGINAL COND.
HEATING: HW X STM __ DIRECT FIRED --> NG __ OIL __ ELC__ OTHER __
~~COOLING: CW __ DX __. FROM CHILLER __________, FROM DX UNIT~~ _______
REHEAT: # OF COILS ___ TYPE _____. RECOOL: # OF COILS ___ TYPE ____
HUMIDITY: STM __ SPRAY __ ELC __. HW/CW COIL VALVES: 2 WAY __, 3 WAY __

DAMPERS:
O.A. DAMPER: __ (Y, N), IF YES, FIXED __%, MODULATING __% TO __%
R.A. DAMPER: __ (Y, N) IF YES, FIXED __%, MODULATING __% TO __%
E.A. DAMPER: __ (Y, N), IF YES, FIXED __%, MODULATING __% TO __%
ECONOMIZER: __ (Y, N) IF YES, OA __ RA __ ENTHALPY __
OA LEAKAGE: _______% IF NO, CAN ECONOMIZER BE ADDED _________

FILTER CONDITION: ___GOOD X FAIR ___POOR

SYSTEM OPERATION:	MON - FRI		SAT		SUN	
*PRESENT OPERATION:	______ TO	_____	_____ TO	_____	_____ TO	_____
*REQUIRED OPERATION:	_____ TO	_____	_____ TO	_____	_____ TO	_____

	HEATING SETPOINTS				COOLING SETPOINTS			
	WEEKDAYS		WEEKENDS		WEEKDAYS		WEEKENDS	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
*PRESENT TEMP:	_____	_____	_____	_____	_____	_____	_____	_____
*REQUIRED TMP:	_____	_____	_____	_____	_____	_____	_____	_____

HUMIDIFICATION REQUIREMENTS (RH): ____ HUMIDISTAT LOCATION: _____

SYSTEM SETPOINTS: MIXED AIR ___°F, HOT DECK ___°F, COLD DECK ___°F
TIME CLOCK: ___ (Y, N), IF YES, IS IT OPERATIONAL ___ (Y, N)

CONTROLS: PNEUMATIC ______, ELECTRIC ______, PNEUMATIC/ELEC X

EQUIPMENT CONDITION: EXCELLENT(E), GOOD(G), POOR(P) T'STAT ___
H'STAT ___ COMPR ___ DAMPERS ___ LINKAGES ___ FANS ___ SHEAVES ___
VALVES ___ ACTUATORS ___ BELTS ___ MIXING BOX ___
OTHER___

COMMENTS: * ESTIMATED
1" 3-way HW C.V.

Bldg No.: 8192

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

UNITARY HEATING EQUIPMENT:

UNIT NO.	TYPE	OUTPUT CAPACITY MBH	HEATING SOURCE	CFM	HP	STARTER & CONTROL	SETPOINT
MU1	UV	106.5	MTW	2145	*1/3		
MU2A	UV	109.25	MTW	2200	*1/3		
MU2B	UV	109.25	MTW	2200	*1/3	AUTO	
MU3	UV	248.3	MTW	3360	*1/2	AUTO	
MU4	UV	238.36	MTW	3360	*1/2	AUTO	2-speed
MU5	UV	268.2	MTW	3360	*1/2	AUTO	
MU7	UV	278.1	MTW	3560	*1/2	AUTO	
MU8	UV	268.2	MTW	3360	*1/2	OFF	
UH1A	UH	144.0	MTW	*4760	3/4		
UH1B	UH	144.0	MTW	*4760	3/4		
UH1C	UH	144.0	MTW	*4760	3/4		
UH1D	UH	144.0	MTW	*4760	3/4		
UH1E	UH	144.0	MTW	*4760	3/4		
UH2	UH	80.0	MTW	*2100	1/3		
UH3A	UH	366	MTW	*12,700	2		
UH3B	UH	366	MTW	*12700	2		
UH3C	UH	366	MTW	*12700	2		
UH3D	UH	366	MTW	*12,700	2		
UH3E	UH	366	MTW	*12,700	2		
UH3F	UH	366	MTW	*12,700	2		

FILM #: ______ ~~FRAME #:~~ * ESTIMATED

NOTES: TYPE --> unit heater, unit ventilator, duct furnace, wall furnace, etc.
HEATING SOURCE --> electric, gas fired, oil, steam, hot water, etc.
STARTER & CONTROL --> momentary, maintained, line v stat, 24 v stat, self contained, etc.

Bldg No.: 8142 ZONE 1

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

UNITARY HEATING EQUIPMENT:

UNIT NO.	TYPE	OUTPUT CAPACITY MBH	HEATING SOURCE	CFM	HP	STARTER & CONTROL	SETPOINT
UH 10A	UH	200	MTW	*4230	2/3		
UH 10B	UH	200	MTW	*4230	2/3		
		ZONE 3					
UH 5B	UH	4	MTW	* 3000	1/25		
UH6A,B,C	UH	63	MTW	*1580	1/4		
UH 7	UH	29	MTW	*800	1/8		
UH8A,B,C,D	UH	44	MTW	*1580	1/4		
		ZONE 4					
UH 9	UH	14	MTW	*3000	1/20		
UH 5A	UH	4	MTW	*3000	1/25		

FILM #: ______ ~~FRAME #:~~ * ESTIMATED

NOTES: TYPE --> unit heater, unit ventilator, duct furnace, wall furnace, etc.
HEATING SOURCE --> electric, gas fired, oil, steam, hot water, etc.
STARTER & CONTROL --> momentary, maintained, line v stat, 24 v stat, self contained, etc.

Bldg No.: 8142 ZONE 1

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

EXHAUST FANS:

UNIT NO.	TYPE		CFM	HP	STARTER & CONTROL	SETPOINT
EF-2	CENT	I/L W/MU-1	1950	1/2	Auto	0.75 SP
EF-3	CENT	I/L W/MU-2A	2200	1/6	Auto	0.25
EF-4	CENT	I/L W/MU-3	3360	1/4	Auto	0.30
EF-5	CENT	I/L W/MU-4	3360	1/4	Auto	0.30
EF-6	CENT	I/L W/MU-5	3360	1/4	Auto	0.30
EF-7	CENT	I/L W/MU-7	3360	1/4	Auto	0.30
EF-8	CENT	I/L W/MU-8	3360	1/4	Auto	0.30
EF-9	CENT	I/L W/MU-2B	2200	1/4	Auto	0.25
EF-10A-F	CENT		6000	1/2	T-Stats	0.25
EF-11A-D	CENT		5000	1/2	T-Stats	0.25
EF-12	CENT	I/L W/HV-1	1800	1/6	Auto	0.25
EF-13A,B	CENT		500	1/12	ON/OFF	0.25
EF-15	CENT		1200	1 1/2	ON/OFF	4.00
EF-16	CENT	I/L W/MZ-1	500	1/6	Auto	0.50
EF-17	CENT		350	1/6	T-Stats	0.50
EF-18A,B	CENT	I/L W/MU 3&7	200	1/12	Auto	0.50
EF-19A,B	CENT		4800	3	ON/OFF	2.50
EF-20A,B	CENT		5400	3	ON/OFF	2.00
EF-21	CENT		4200	1/3	T-STAT	0.25
EF-1	CENT	I/L W/MU-6	2140	1/3	Auto	0.50

FILM #: ________ ~~FRAME #:~~ I/L = INTERLOCKED

NOTES: TYPE --> propeller, centrifugal, etc.
STARTER & CONTROL --> momentary, maintained, line v stat, 24 v stat, self contained, etc.

Bldg No.: 8142

*** FMEA SURVEY OBSERVATIONS ***

MECHANICAL EQUIPMENT DATA

HEATING PLANT

PLANT DESCRIPTION:
NUMBER OF UNITS: ___
MAKE & MODEL: 1) CENTRAL PLANT HEATING/COOLING
2) ___
3) ___

EQUIPMENT: ___ BOILER ___ DIRECT FIRED ___ STEAM CONV X HT CONVERTER
TYPE: ___ STEAM HT HW ___ CAST IRON ___ WATER TUBE, FIRE TUBE
FUEL: NAT GAS _____ ELECTRIC _____ OIL _____ OTHER ___

MULTIPLE UNIT OPERATION SEQUENCE:
SERIES ___ PARALLEL ___

BURNER STAGES: ___

FIRING RATE/FUEL: #1: ___ #2: ___

BURNER TYPE: ___ POWER: MFR ___ MOD No. ___
BLOWER ____/__/___-____A _____HP @_______CFM
CONTRL ____/__/___-____A
___ ATMOS: MFR OKR ___ MOD No. ___

3-WAY VALVE & OPERATOR - REPLACE

X HOT WATER: SUPPLY SIZE 4" TEMPERATURE 200 PRESSURE ~60 PSI
RETURN SIZE ___ TEMPERATURE ___ PRESSURE ___ PSI
___ STEAM: HEADER SIZE ___ TEMPERATURE ___ PRESSURE ___ PSI

RATED CAPACITY: MAX BTUH IN ___
MAX BTUH OUT ___

CONTROLS: TYPE ___
CONDITION ___

PLANT AUXILIARIES:
PUMPS: HW 1) 480/3/60-38A 7 1/2 HP
2) ____/__/____-____A _________HP
CHW ~~COND~~ 1) 480/3/60-38A _________HP
2) ____/__/____-____A _________HP

Trane PAC Chilled Water
Mod. CGAA0154HE53CCS
4A361E
Comp. 2 at 460V
RLA: 14.9 / LRA: 90 } @ Comp. 3 Phase

FANS: 1) ____/__/____-____A _________HP @_________CFM
2) ____/__/____-____A _________HP @_________CFM
3) ____/__/____-____A _________HP @_________CFM

Cond Fans
3 at 1.3 FLA
0.33 HP (1 Ph

OTHER 1) ____/__/____-____A _________HP
2) ____/__/____-____A _________HP

AUX OPERATING SCHEDULES:
PUMPS: HW 1) ON_____ OFF_____ 2) ON_____ OFF_____
COND 1) ON_____ OFF_____ 2) ON_____ OFF_____
FANS: 1) ON_____ OFF_____ 2) ON_____ OFF_____ 3) ON_____ OFF_____
OTHER: 1) ON_____ OFF_____ 2) ON_____ OFF_____

AUXILIARY FUEL USED: #2 OIL ______ NAT GAS _____ OTHER ______

*- VALVE IS LEAKING
- OPERATOR IS PILOT POSITIONER TYPE

Bldg No.: 8192

GENERAL ENERGY CONSERVATION OPPORTUNITY CHECKLIST

Bldg Name: D/S MTCE FAC Bldg #: P8142 Contact: SFC Kessler Phone #: X5760 Surveyed By: PK Date: 12-12-84

ECO TITLE	ANNEX A	DATE	ANNEX B	DATE	COMMENTS
INSULATION	A1		# B01		N/A
STORM WINDOWS or DOUBLE GLAZING	A2		# B02		N/A
WEATHER STRIPPING and CAULKING	A3		# B03		N/A
INSULATED PANELS	A4		# B04		N/A
VESTIBULES or REVOLVING DOORS	A5		# B05		N/A
LOAD DOCK SEALS (Strip Door or Air Cu)	A6		B06		N/A
REDUCTION of GLASS AREA	A7		B07		N/A
REPLACE KITCHEN LIGHT FIXTURES	A8		# B08		N/A
SHUTDOWN DHW or MOD CTRLS (Non FH)	A9		B09		N/A
REDUCE LIGHTING LEVELS	A10		# B11		N/A HID IN PLACE
REPLACE INCANDESCENT LIGHTING	A11		# B12		N/A NONE
USE MORE EFFICIENT LIGHTING SOURCE	A12		# B10		N/A PRESENT
HIGH EFFICIENCY MOTOR REPLACEMENT	A13	✓	B13		—
NIGHT SETBACK/SETUP THERMOSTATS *	A14		# B14		N/A PRESENT
INFRARED HTRS (Motor Rep Shops & Whse)	A15	✓	# B15		? IN HIGH VENT RATES
ECONOMIZER CYCLES (Dry Bulb Type)	A16		# B16		MANUAL RESET ON OA
CONTROL HOT WATER CIRC PUMP *	A17		# B17		POSSIBLE
FM RADIO CONTROLS	A18		B18		N/A
RADIATOR CONTROLS	A19		B19		N/A
DECENTRALIZE DHW HTRS (POU Htrs) *	A20		B		N/A HI-M CENTRAL IN PLACE
HEAT RECLAIM from HOT REFRIG GAS	A21		# B20		N/A
REDUCE AIR FLOW *	A22	✓	# B21		POSSIBLE
PREVENT AIR STRATIFICATION *	A23	✓	# B22		POSSIBLE
INSTALL TIME CLOCKS	A24		B23		IN PLACE
CHILLER REPLACEMENT	A25		B		N/A
REPLACE ABSORPTION CHILLER	A26		B38		N/A
INSULATE STEAM LINES	A27		B26		N/A
RETURN CONDENSATE	A28		B27		N/A
TRANSFORMER OVERVOLTAGE	A29	✓	B31		?
TRANSFORMER LOADING	A30	✓	B30		
REVISE OR REPAIR HVAC CONTROLS	A31		B32		GOOD CONDITION
WASTE HEAT RECOVERY *	A32		B33		DIRTY EXH
ADD ADDITIONAL LIGHT SWITCHES	A33		B35		IN PLACE
HVAC INIT/BLDGS WITH SEPARATE BOILERS	A34		# B37		N/A
STANDARD SOLUTIONS for EXT LIGHTS	A35	✓	# B36		?
BOILER OXYGEN TRIM CONTROLS	A		B24		N/A
REVISE BOILER CONTROLS	A		B25		N/A
PRE-HEAT DHW	A		B28		N/A
HEAT PUMPS	A		# B29		N/A
EMCS	A		B39		SEPARATE STUDY
HOT WATER RECIRC PUMPS	A		M40,17		?
HPS STREET LIGHTS	A		M41		QUARTZ IN MAINT. BAYS
ELECTRIC OUTLET INSULATION	A		M42		N/A

<*> Denotes ECO's studied by Burns & McDonnel
<#> Denotes ECO's common to Military Family Housing

E M C ENGINEERS, INC.

Denver • Colorado Springs • Atlanta • West Germany

JOB FTC EEAP UPDATE #2102-001

SHEET NO. ______ OF ______

CALCULATED BY TF DATE 10-29-92

CHECKED BY ______ DATE ______

SCALE ______

SOLARWALL STUDY

#8142: MON-FRI 0700 TO 1630

#8030: 24 hr/DAY, 7 DAYS/WK

#8300: MON-FRI 0700 TO 1700

SOURCE: AFZC-EMC / W. WHITE & STEVE SNYDER

JOB FTC, EEAP UPDATE #2102-001

SHEET NO. 1 OF 6

E M C ENGINEERS, INC.

Denver • Colorado Springs • Atlanta • Germany

CALCULATED BY TF DATE 10-29-92

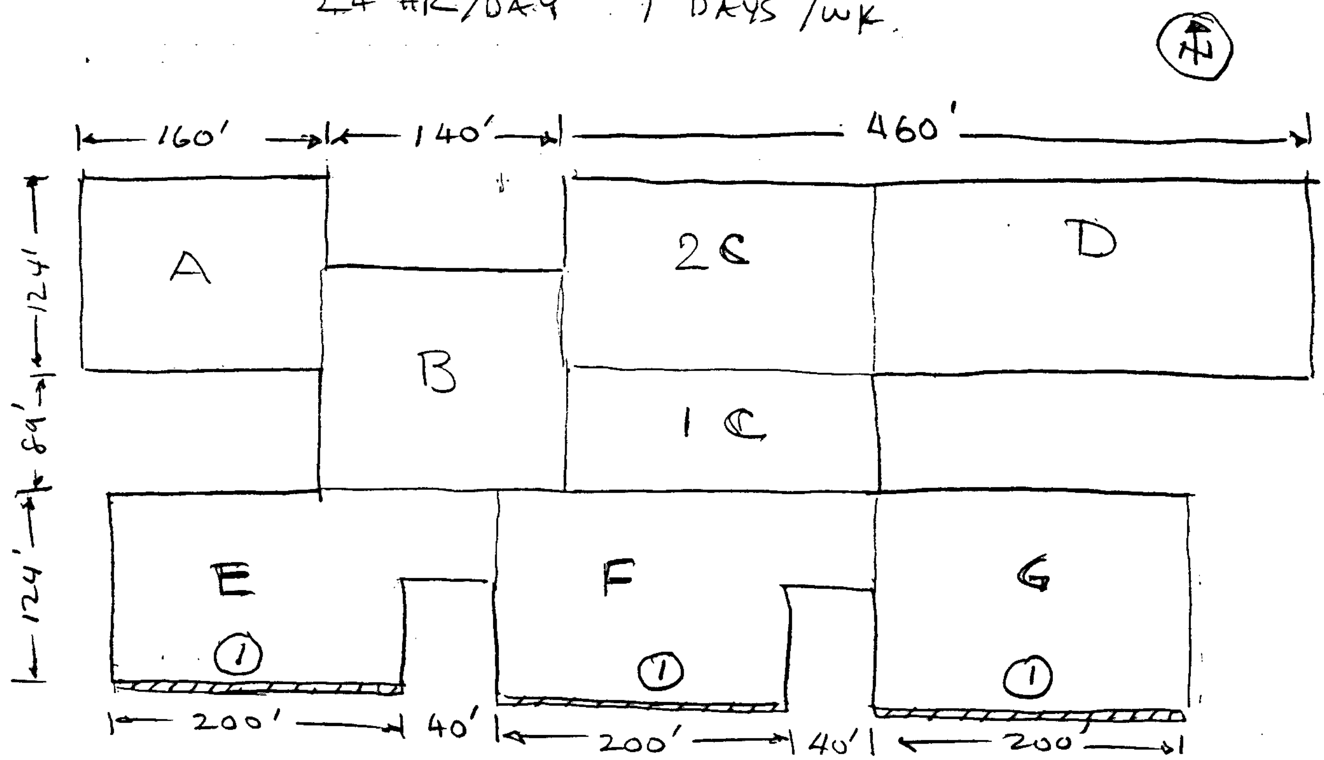
CHECKED BY DATE

SCALE

P-8030 BLDG DATA.

DIRECT SUPPORT MAINTENANCE FACILITY.

- WILL BE INCLUDED IN THE UCS W/DDC CONTROLS IN '93.
- BLDG OPERATING SCHEDULE (OCCUPANCY)
  24 HR/DAY 7 DAYS/WK.



KEY PLANFORM ELEV = 5,818'

(1) APPLY SOLAR WALL

JOB

SHEET NO. 2 OF 6

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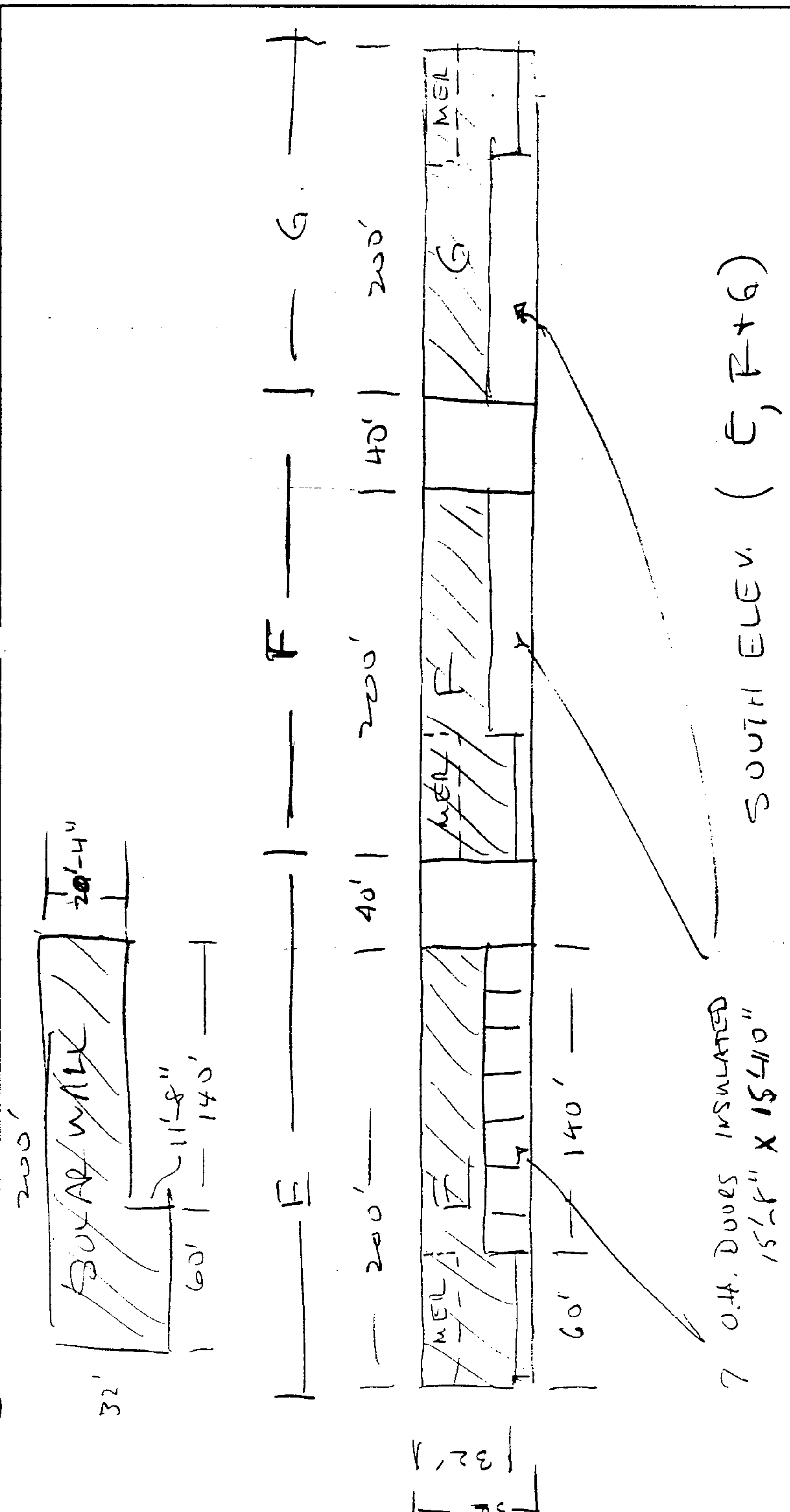
CALCULATED BY TF DATE 10/92

CHECKED BY DATE

SCALE



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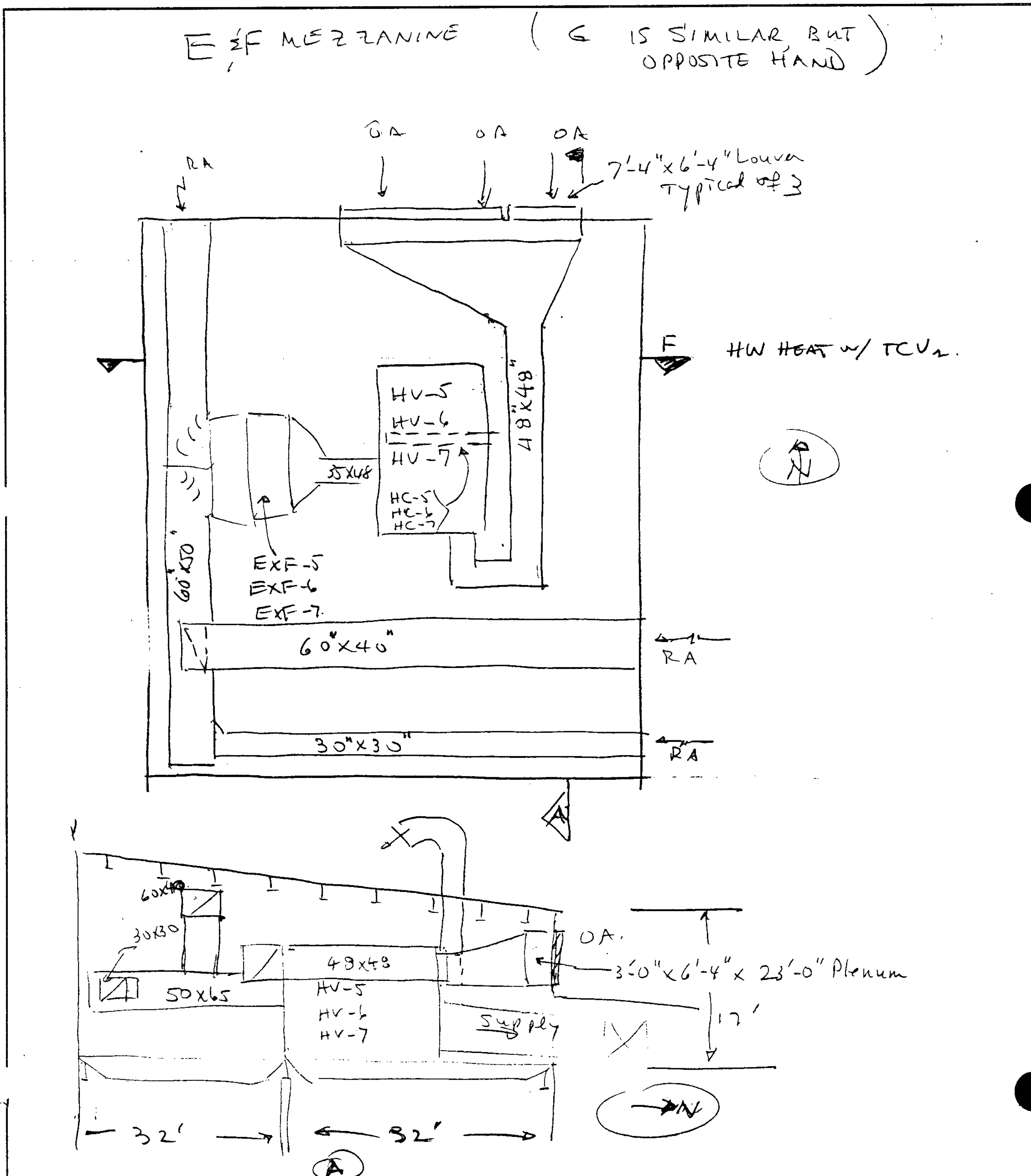
JOB

SHEET NO. 3 OF 6

CALCULATED BY TF DATE 10/92

CHECKED BY DATE

SCALE



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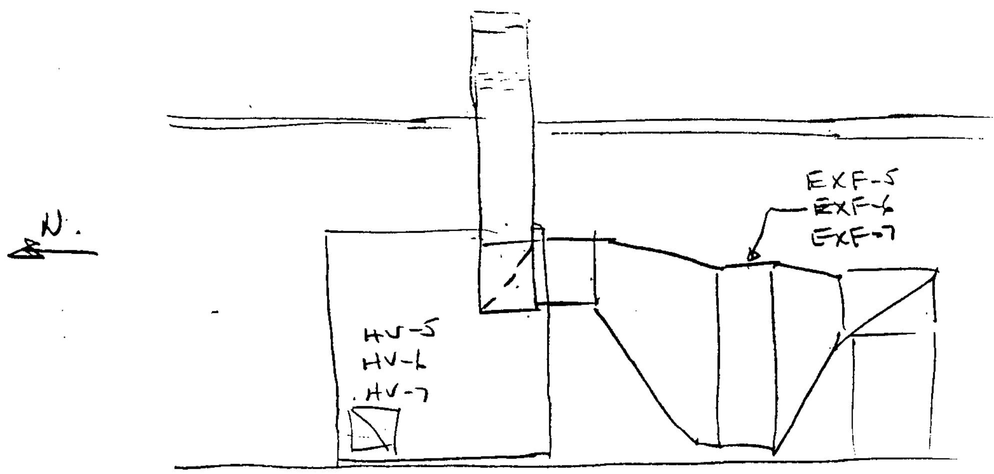
SHEET NO. 4 OF 6

CALCULATED BY TF DATE 10/92

CHECKED BY DATE

SCALE

E & F MEZZANINE (G IS OPPOSITE HAND.)



SECTION F

MECH SCHEDULE

ALL DATA FOR 6,000 FT. ALTITUDE

HV-5, 6 & 7 47,000 CFM SUPPLY & EXHAUST
3 IN. H_2O S.P. SUPPLY FAN
3 IN. H_2O SP EXH FAN

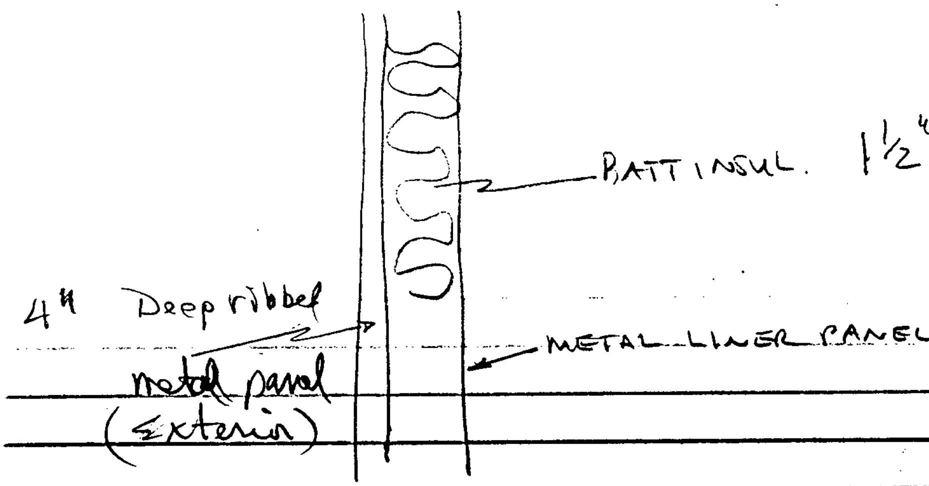
HEAT WHEEL Thermal eff (at sea level) = 71% (INOP)

HC-1, 2 & 3 422,000 BTUH
EAT = 40°F
ΔT = 35°F
GPM = 77

HV-5 47,000 CFM
HV-6 3" H_2O SP.
~~HV-7~~

~~EXF 5~~ 47,000 CFM
~~EXF 6~~ ~~3" H_2O S.P.~~
EXF 7

EXT WALL SECTIONS FOR
SOLAR WALL



ROOF